EVALUATION OF TESTIMONY

The East Harris County Manufacturers Association (EHCMA), the Houston Galveston Area Council (H-GAC) Board of Directors (BOD), Houston Lighting & Power (HL&P), Texas Chemical Council (TCC), Amoco, and Greater Houston Partnership (GHP) commented that although the State Implementation Plan (SIP) modeling conclusions state that nitrogen oxides (NO_x) reductions from all source categories will be needed to attain the ozone standard in Houston, the SIP appears to focus on point sources and could give the public the perception that NO_x reductions from point sources alone could be sufficient to achieve the standard. They further recommend that Table 32 of the proposal be revised to include all known potential NO_x control measures, including the more controversial local measures.

The commission agrees that NO_x reductions from most source categories (point, non-road mobile source, on-road mobile source) will be needed to attain the standard in Houston. The state options strategy, which has a regional focus, contains measures that apply to these source categories. Furthermore, the commission has quantified several federal control programs which will apply to on-road and non-road mobile sources. The commission has sought public comment from the local area on the types of control measures that they would be interested in analyzing for inclusion in a future SIP revision. Before any control strategies are adopted into the SIP revision due in 2000, the commission intends to test all proposed control strategies with modeling to ensure that they contribute to attainment.

EHCMA, TCC, and Amoco commented that the listed federal measures will provide more volatile organic compound (VOC) reductions than are necessary to attain the 1-hour standard. Therefore, they

believe that the extension of VOC Reasonably Available Control Technology (RACT) and Stage I vapor recovery rules into the 100 km region are not necessary for the purposes of this SIP, and that Table 33 should be revised to remove potential VOC measures that are not required for ROP or attainment.

The commission disagrees with the commenters. The Urban Airshed Model (UAM) modeling has shown that early reductions in VOC are needed to offset any potential NO_x disbenefit that may occur in the early stages of implementing NO_x control measures. Many of the federal VOC measures listed in the SIP will achieve their maximum reductions only in the later part of the period from 2000 to 2007. Therefore, the emission reductions from programs like those discussed in the regional strategy are important for the Houston/Galveston (HGA) Area SIP. The commission also believes that it is appropriate to begin to focus on regional air quality issues, and that the state clean air strategy will assist the HGA area not just by providing numeric reductions to satisfy U.S. Environmental Protection Agency (EPA) targets, but, more importantly, by ensuring that background levels of ozone entering the HGA area are lower, which will assist the area in attaining the ozone standard.

EHCMA, GHP, TCC, Amoco, Texas Association of Business and Chambers of Commerce (TABCC), and DuPont recommended that the SIP include a plan to prioritize the future selection of NO_x and VOC controls based on their benefit/cost ratios as measured by unit reduction in ozone exposure per unit of annualized cost. They further recommended that potential future control strategies should be selected for rulemaking only if they have a better benefit cost ratio than the remaining alternative measures.

The commission believes that while this may be one way to analyze control strategies in the selection process, it is not strictly an issue in this SIP proposal. On January 16, 1998, EPA

published the Interim Implementation Guidance (IIG) for areas that have not yet attained the 1-hour ozone standard. That guidance requires states to submit, in April 1998, a list of rules and/or a control strategy that could be used to attain the standard by the attainment date. This guidance does not require that states submit a set of fully adopted regulations at this time. Rule selection, development, and negotiation will require an intensive time-consuming effort and dialogue with affected parties. Therefore, the commission will not commit to any particular method of selecting control strategies at this time, but rather will work with the commenter and other HGA area stakeholders to develop an appropriate selection process to be used for the next phase of the attainment demonstration.

The Sierra Club Houston Regional Group (SCHRG) commented that the state should include drastic measures with specific NO_x reduction mechanisms to achieve 75% NO_x reductions, phased in over the next five years. They believe that this strategy, combined with reductions in VOCs, will assist with attainment of the ozone standard plus other air pollution and public policy goals, such as improved rain quality and traffic congestion reduction.

The commission agrees that large-scale reductions in NO_x on the order of 65-85% will be required to achieve the ozone standard in HGA. The year 2003 may be the compliance date for many of the major point source rules. The commission also agrees that reductions in VOCs will be needed to offset a predicted slight ozone disbenefit in the early stages of making NO_x reductions. However, the public policy goals such as improved rain quality and traffic congestion reduction are outside the scope of this rulemaking.

SCHRG, Sierra Club Air Quality Committee (SCAQC), Mothers for Clean Air (MCA), American Lung Association (ALA), Galveston - Houston Association for Smog Prevention (GHASP) and several individuals commented that all grandfathered sources of air pollution should be permitted to meet emission standards which would be imposed without the privileged grandfathered status. The SCHRG also believes that if applicable to the particular source, the Best Available Control Technology (BACT) should be required.

The agency is currently developing a plan for the permitting of "grandfathered" facilities, as required by House Bill 3019 which was passed last session. This plan will require legislative action, and, therefore cannot be effective prior to the summer of 1999. Moreover, this plan must provide for voluntary participation, so the agency cannot reliably predict the number of participating facilities. As a result, any attempt to quantify the reductions which may result from the plan for permitting "grandfathered" facilities would be purely speculative. Although several companies have committed at this time to enter the program, these commitments per se are not enforceable. Most of those companies have not yet submitted applications or been issued enforceable permits, so the agency cannot estimate the reductions in VOC and NO_x.

SCHRG, ALA, an individual, and GHASP commented that the commission should not delegate decisions on specific air control measures and strategies to local governments, because they believe that local governments are too easily dissuaded through political pressure from reducing air pollution.

The commission has announced a comprehensive, common-sense reduction strategy for the eastern half of the state that will reduce ozone levels. Federal measures also make sense for certain types of sources that are more effectively controlled on a national level. The commission proposed a SIP

quantifying known federal and state measures and asked local citizens and stakeholders to suggest additional control measures that they were interested in exploring for possible future measures. The commission has not suggested delegating decision-making authority on specific rulemakings to the City of Houston or any other entity. However, the commission believes that there is an appropriate role for local governments and other entities to provide in the decision-making process, and that many control strategies will not succeed unless there is broad-based local support for them.

GHP, GHASP, Sierra Club (SC) and one individual commented that a more stringent Inspection & Maintenance (I/M) program, such as IM240, should be considered. The League of Women Voters (LWV), GHP, SC, GHASP, and two individuals commented that the commission should consider expansion of the I/M program to the surrounding counties.

The Health and Safety Code §382.0372 limits the applicability of the I/M program to only four counties -- Harris, Dallas, Tarrant, and El Paso. However, a county may voluntarily choose to participate in the I/M program if the county government and the largest city in that county request, by resolution, an air quality plan containing the Texas Motorist Choice (TMC) program. These comments have been included in the local options section of the SIP.

The current I/M program, using the TX96 analyzer, meets the current requirements for a low-enhanced I/M program as outlined in the I/M Flexibility Amendments to the Federal I/M Rule. If future emission reduction requirements from on-road mobile sources exceed reductions being achieved by the current program, alternatives such as a more advanced analyzer capability would be considered. This suggestion has been included in the local options portion of the SIP.

SC and GHASP commented that mandatory employer-trip reduction (ETR) programs must be implemented to reduce vehicle air pollution.

In December 1995, President Clinton signed HR 325 amendment to the Federal Clean Air Act (FCAA) Amendments making ETR programs optional for states. For Texas the only area affected was the HGA area. The ETR program was revised into a regional program that removed the mandatory requirements from employers and provided regional flexibility in implementing trip reduction programs. As a part of this flexibility, the Regional Commute Alternatives Program established a successful vanpool program that operates more than 230 vans in the area. Therefore, no change has been made to the SIP.

SCHRG, H-GAC BOD, LWV, TCC, Amoco, and GHP commented that the SIP should offer a list of control measures as well as estimated cost measures to give local governments and citizens an idea of what to expect.

The commission agrees with the commenters that cost analysis will be an important factor in the selection of control measures. However, the purpose of this SIP is to lay out the estimated level of reductions necessary to achieve attainment in HGA and potential control measures to achieve those reductions, not to select the final control measures. The commission looks forward to working with the commenters during the strategy selection process to develop cost-effectiveness estimates and other information about potential control measures.

SCHRG, ALA, an individual, and GHASP commented that pollution prevention, with source, upset, and spill reduction plans, must be required for large air polluters--they suggest a reduction of at least

50% by quantity through these pollution prevention plans. They further endorse technologically feasible and affordable controls, such as selective catalytic reduction, for large NO_x emitters.

The commission agrees that pollution prevention should be an important goal in industrial facility operation, and supports facilities that engage in active pollution prevention. The commission also has an upset-maintenance rule to minimize and record accidental releases and takes enforcement action against negligent facilities. However, by their very nature, upsets are accidental, and therefore, unplanned. It is therefore difficult to envision a rule which could more effectively control upset emissions. Therefore, no change has been made to this SIP.

SCHRG and GHASP commented that the Houston Air Excellence in Leadership (HAXL) program should function only to offer ways to reduce other pollutants like fine Particulate Matter ($PM_{2.5}$), toxics, and other criteria pollutants, rather than as a pollutant trade-off strategy.

The commission supports the essential HAXL mission, which, as it understands it, is to better understand health risks of various pollutants in the HGA area, so as to prioritize reductions to obtain the maximum health benefits in the most cost-effective manner possible. Therefore, no change has been made to this SIP.

SCHRG commented that the implementation of controls must be supported with extensive investigations and ongoing monitoring to ensure compliance with selected reduction strategies.

The commission agrees. Many previous rules have monitoring and record-keeping requirements that help to ensure compliance. Additionally, the commission's field office staff work to make

inspection of facilities with newly-applicable rules a high priority, to assist these businesses in implementing the new rule and maintaining compliance with it. Additionally, the commission's Small Business Advocate works with small businesses that are affected by commission rules to make sure that they understand the rules and how to comply with them.

SCHRG commented that the commission should select one strategy for non-point sources and one strategy for point sources, and implement them immediately. Furthermore, they commented that modeling and emissions inventories should "ignore this initial reduction as it is part of the prescribed cure for our ailing air."

The commission is working to implement several control strategies, such as NO_x RACT and the elements of the Texas Clean Air Strategy, as soon as practicable. However, there is scientific justification for considering the effects of these programs in the emissions inventory or in the modeling. In fact, the failure to do so could distort the reliability of both of these important technical tools.

GHASP and SC commented that large diesel trucks and buses should also be emissions tested.

The commission believes that it can be problematic to use an I/M Program to reduce emissions from heavy-duty diesel vehicles, such as large trucks and buses. The conventional measurement of diesel emissions is an opacity check which determines the "darkness" of the particulate matter (PM) in the exhaust. However, opacity checks are rather limited because they are weak at quantifying emissions levels. Some research is currently being conducted to develop alternative methods of quantifying diesel emissions with a "short test" appropriate for an I/M Program. The

idle emissions test currently used is satisfactory for gasoline-powered vehicles, but is not practical for diesel vehicles. Instead, dynamometers are needed to measure diesel vehicles under load when most of their "smoke" is produced.

As an alternative to emissions testing, EPA has been working with diesel engine manufacturers to reduce hydrocarbons, PM, and NO_x levels at the design and manufacture stage for both on-road and off-road diesel engines. The stated goal is to reduce emissions in new diesel engines in 2004 by 50% from their 1998 levels. The commission strongly supports such efforts and has quantified them in this SIP.

GHASP and SCAQC commented that this SIP is illegal because it does not contain a list of regulations to be implemented and a copy of these regulations so that public can have input, and that is has no schedule to implement these regulations and no cost/benefit figures. GHASP further commented that it is not legal for the commission to delay development of control strategies until 2000.

The commission does not believe that this SIP is illegal. On January 16, 1998, EPA published the IIG for areas that have not yet attained the 1-hour ozone standard. That guidance requires states to submit, in April 1998, a list of rules and/or a control strategy that could be used to attain the standard by the attainment date. This guidance does not require that states submit a set of fully adopted regulations at this time. Rule selection, development, and negotiation will require an intensive time-consuming effort and dialogue with affected parties. The commission intends to use the next two and one half years to work with the local area and affected parties to select and develop the rules. The commission intends to submit these rules to EPA by the required due date of the end of 2000.

GHASP commented that voluntary programs should not be included as part of the SIP because they are not enforceable.

The commission believes that any real reductions in emissions, whether mandatory or voluntary, are beneficial in efforts to improve air quality and thus should be eligible for inclusion in the SIP to the degree they are quantifiable. The commission has not quantified reductions from any voluntary programs for this SIP. However, should the reductions that industries with grandfathered facilities have volunteered become enforceable, they would be quantified and included as part of a future SIP submittal.

GHASP commented that the emissions inventory is inaccurate and underestimates both NO_x and VOC emissions. GHASP further commented that "to make the UAM work, the commission had to assume 2-6 times higher VOC/NO_x ratios," and that there must be a commitment in the SIP to "determine what the actual emissions are and correct the present emission inventory (EI)." GHASP further stated that the commission modified the inventory to get the model to work, and again calls for emissions inventory improvements to be spelled out in the SIP. GHASP commented that "the commission admits that the EI is off as much as 2-6 times higher than the predicted VOC/NO_x ratio" and claims that there is "no comprehensive solution to correcting each defect and allowing the public to comment on the approach to be used."

The commission acknowledges that the emissions inventory contains significant uncertainties; however, it is unaware of conclusive evidence indicating that emissions of VOC and NO_x are

underestimated in general. The commenter is encouraged to share with the commission the information upon which the claim of underestimation is based.

The commission is continuing to improve the emissions inventory process through initiatives such as participation in the national Emissions Inventory Improvement Program and by conducting regular seminars with industry. The commission attempts to use the most accurate, timely emissions data possible in its modeling activities. Data for area, mobile, and biogenic sources is developed by commission staff or under contract, and is based upon EPA-approved methodologies. Emissions for point sources are submitted by industry, and every effort is taken to ensure the accuracy of the numbers submitted by industry and entered into the commission's Point Source DataBase (PSDB). A letter was sent to each submitting account representative giving a summary of emissions updated into the PSDB for 1996 soliciting input to correct any errors. Commission staff will continue working with industry to correct the reported inventory.

The commenter is mistaken in the assertion that the commission had to modify the inventory to make the model work. The model performed quite well for the September 8-11 episode using an unmodified emissions inventory. In fact, when the two alternative inventories (designed to more closely match ambient data) were used, model performance was not quite as good as that of the unmodified inventory.

The commenter is also mistaken in the assertion that "the commission admits that the EI is off as much as 2-6 times higher than the predicted VOC/NO_x ratios." The commission actually stated that "ratios from ambient air sampling may range from two to six times as high as ratios predicted from the modeling inventory, suggesting that the modeling inventory may have an over-

abundance of NO_x, a deficiency of VOC, or both." Because there is only an indirect relationship between ambient ratios and inventory ratios, it is not possible to determine the extent of error in the inventory VOC/NO_x ratio based on ambient ratios alone.

The commission agrees in principle with the comment that the emissions inventory should be improved, although it is not possible to develop an inventory that is absolutely correct in all cases. In the "Conclusions" subsection of "Reasonable Achievable Target Modeling," the commission states that it will "continue to improve upon its methodologies to more accurately characterize air quality in the region through modeling." This commitment applies to improving both model inputs (e.g. emissions inventory) as well as improving modeling technology. Because of the extraordinarily complex nature of photochemical modeling, however, it is unlikely that a "comprehensive solution to correcting each defect" can ever be developed.

Finally, the public is always welcome to suggest means of improving the modeling technology used. Commission staff routinely meets in open forums to discuss technical details of the modeling, with groups such as the Modeling Technical Committee (MTC) and the Regional Air Quality Planning Committee, and would welcome comments from individuals or organizations such as GHASP.

GHASP commented that the state should front-end load reductions, because attainment of the standard will be based on having clean data in 2005, 2006, and 2007.

The commission agrees in part with the commenter. The commission has proposed a proactive regional strategy in its Texas Clean Air Strategy, which is expected to have wide-ranging air

quality benefits for the entire eastern half of the state, including the HGA nonattainment area. However, the commission also believes that certain types of controls will need a longer lead time to be cost-effectively implemented. As the commission works over the next two years to select the strategy for the HGA area, it will attempt to select a set of control strategies that make sense for the short, medium, and long term.

GHASP commented that the SIP should contain a commitment to better enforcement with additional training, personnel, equipment, and number of inspections in this SIP.

The commission is committed to compliance assistance and appropriate enforcement for every regulation it develops. Because there are no specific regulations associated with this SIP, specific enforcement provisions are not a part of this SIP.

GHASP commented that the comprehensive regional strategy must be more fully developed before the agency or the public will know the impacts of the specific strategies.

The commission agrees with the commenter, and will develop the rules to implement the provisions using input from the public and stakeholders using the standard public comment process. However, fully adopted regulations are not required as part of this SIP.

GHASP commented that the commission needs to support the California emission standards for vehicles and not just the 49-car standard. They believe that HGA needs all the emission reductions they can get if they are to make a serious attempt to reach the 2007 nonattainment goal. They believe this is

particularly important since it takes so long to have vehicle fleet turnover and thus emission reductions of any sizeable amount.

EPA determined that the National Low Emission Vehicle (NLEV) program would be in effect on March 2, 1998. Before this determination could be made, vehicle manufacturers and the northeastern ozone transport states had to voluntarily opt-in to the program. Manufacturers agreed to produce the vehicles at NLEV standards, while additional states agreed not to implement California Low Emission Vehicle standards. This agreement by manufacturers ensures NLEV availability throughout the nation. Beginning in 2001, vehicles meeting NLEV standards will be delivered for sale in Texas. Initially, NLEV standards parallel California emission standards. While over time California standards become more stringent California reformulated gasoline (RFG) must be used to meet the California emission standards.

GHASP expressed concern that the Maximum Available Control Technology (MACT) reduction tables indicate that the MACT standards often will not provide significant VOC emission reductions beyond those resulting from Chapter 115 (RACT) and Chapter 116 (BACT and Lowest Achievable Emission Rate (LAER)). An individual expressed the desire that large ozone precursor emitters be subject to BACT and LAER.

A MACT standard may be less stringent than RACT, BACT, or LAER for the control of VOC emissions. This has to do with the strength of the Texas New Source Review Permitting program, as well as the fact that the MACT standards are only targeting hazardous air pollutants (HAPs) whereas Chapters 115 and 116 target all VOCs for control. Large ozone precursor emitters are subject to RACT, and, with the exception of grandfathered sources, are subject to BACT and

LAER through the permitting process. The MACT reductions for HAPs shown in the tables are those that are expected above and beyond RACT, BACT, and LAER.

GHASP commented that this SIP does not contain a prioritized list of control strategies and an implementation schedule. GHASP further believes that there should be an approximation of the costs and benefits of each control strategy.

The commission believes that all of the elements that the commenter requested are an appropriate part of the control strategy selection and rule development process. However, they are not required to be part of this SIP submittal.

GHASP commented that the SIP does not contain an explanation of what the commission will do about emission reductions that were initially planned for the ETR Program and the original I/M 240 vehicle emissions testing program.

These elements of the initial 15% SIP were addressed and remedied in the "SuperSIP" which was adopted by the commission on July 24, 1997. Therefore, they are not discussed again in this SIP revision.

GHASP commented that the commission has not yet modeled for the loss of part of the 9% reductions. GHASP believes that there is no excuse for the commission not having done this, because they had two extra years to develop this plan.

The commission agrees that this refinement to the modeling did not take place before this SIP was proposed. The commission will be refining the modeling to account for the change to the Post-96 control strategy package and other EI refinements when it does control strategy testing for the SIP submittal due in late 2000. To the commenter's other point, EPA proposed disapproval of the 9% SIP on March 9, 1998. Prior to this proposed disapproval, the commission was trying to negotiate with EPA to approve the SIP as originally adopted. Therefore, the change in control strategy was quite recent, and there was not adequate time to model the effects of the change before the proposal.

GHASP commented that the reductions for I/M had not been incorporated in any modeling.

The on-road mobile source emissions estimates developed for the 1993 Coastal Oxidant Assessment for Southeast Texas (COAST) project were designed to provide the most accurate, detailed modeling input possible using available tools. However, during the development of the COAST emissions estimates, the I/M program was changed due to the National Highway Systems Designation Act. As such, the initial COAST emissions projected for 2007 for the HGA nonattainment area did not include I/M. The modeling indirectly accounted for I/M through across-the-board VOC reductions, but I/M was not directly modeled for this SIP. The I/M program will be explicitly modeled during detailed control strategy development.

GHASP commented that the present I/M program is "not working" and is allowing almost 300,000 cars to escape being inspected.

The current I/M program in the Houston area began in January 1997. Data for the first full year of operation indicates that 84.3% of the required vehicles were tested and passed the emissions

test. Although this is short of the 96% compliance rate that was modeled, it does represent a fairly good compliance rate for a program in its first year of operation and indicates general acceptance by the regulated community. It should be noted that this 84.3% is the total number of unique vehicles tested in the Houston area divided by the total 2-24 year old gasoline-powered vehicles currently registered in Harris County and does not account for those vehicles which are registered within but are operated primarily outside of Harris County. The commission is making arrangements to more accurately quantify the compliance rate by performing vehicle-to-vehicle matching between the emissions testing and registration databases. Unfortunately, this is not currently possible, so the estimation is an aggregate comparison of the two databases. The commission anticipates that as the program matures, and database discrepancies are minimized, the compliance rate will climb. Should future analysis indicate otherwise, the commission will make program adjustments as necessary.

GHASP commented that the commission predicates most of its reductions on federal standards that are not final or even proposed, such as that for Marine Vessels.

EPA finalized the Recreational Marine Rule through a direct final rule published in the *Federal Register* on August 7, 1997. The commission was given direction from EPA on how to estimate emission reductions from the program for various years and inventories.

GHASP commented that if reductions are needed in the area outside the 8-county nonattainment area to reduce ozone levels, these reductions should be shown now, and the transboundary and transport problems should be fully discussed and resolved.

The commission agrees that the SIP should contain a more complete explanation of the Texas Clean Air Strategy, and it has been revised to do so. However, the full impacts of all potential control strategies on ozone levels can only be approximated. This will be done using the modeling for control strategy testing on all potential rules during the strategy selection and rule development phase.

GHASP and SCAQC commented that if there are so-called disbenefits from temporarily higher ozone levels, then this calls for more reductions, faster, to reduce or eliminate these disbenefits or shrink their levels or temporal coverage.

The commission agrees with the commenters, and has used the UAM modeling to determine the level of reductions that is needed to minimize this disbenefit. The conclusions from the modeling indicate that approximately 15% reductions in VOCs will be needed to minimize the initial NO_x disbenefit. This is discussed in the conclusions section of the modeling, and reductions for VOCs are quantified in the control strategy section. The commission also believes that the regional strategy will help to offset this disbenefit by making early reductions in VOCs.

GHASP commented that the commission should not use "weasel words" like "can be expected to be attained by 2007." GHASP asserts that this language is not an affirmative statement and does not give the public faith that attainment will occur. GHASP believes that the commission should be assured and not tentative.

The commission believes that with the science of ozone formation and control changing rapidly, and the uncertainties inherent in tools such as the emissions inventory and urban airshed

modeling, that continued further progress in reducing ozone exposure is the appropriate path. For this reason, the commission advocates phased SIP development with a mid-course correction or process evaluation component built in.

GHASP commented that it is very troubling that the commission proposes to do very little to control VOCs.

The commission disagrees with this commenter. The UAM modeling indicates that a 65-85% reduction in NO_x will be required to attain the ozone standard in the HGA area by 2007. It further indicates that a 15% reduction in VOCs will be useful in minimizing a predicted ozone disbenefit to initial NO_x reductions. The commission has laid out an aggressive regional strategy that will achieve both VOC and NO_x reductions. This strategy, combined with the federal measures that will be occurring by 2007, will be more than sufficient to achieve the 15% reductions that the model indicates would be useful.

GHASP commented that it is not clear how sulfur dioxide (SO_2) controls will help reduce ozone, NO_x, or VOC, and asked for an explanation.

The commenter is referring to the Texas Clean Air Strategy, which has a component for future study. The commission believes that there is some evidence that SO_2 may play some role in the formation of ozone, particularly in coastal areas. This issue is currently the subject of much debate in the scientific community. Therefore, the commission committed in the Texas Clean Air Strategy to further study the role of SO_2 in Texas air quality. This commitment was merely referenced in the SIP.

GHASP stated its opposition to market-based incentive systems such as the "cap and allocation" program, claiming that unless there are requirements for reliable, continuous emissions monitoring, such a program is not enforceable if compliance with the emission cap is determined only at the end of each year.

The commission agrees that it is important to balance flexibility with accountability in cap and allocation programs. Continuous emissions monitoring systems, or acceptable alternative methods, for all participating units would likely be an integral part of any state emissions budget program. Although such programs are typically designed for participating sources to perform an annual budget compliance review ("reconciliation"), the agency may inspect monitoring data or request specific unit testing at any time. The description in the SIP narrative was intended to be only a brief overview of one possible scenario for emission reductions, and therefore does not address features of a cap and allocation program in detail. In order to clarify the staff's intent, and to emphasize the importance of continuous emissions monitoring in a cap and allocation program, appropriate language has been added to this portion of the SIP.

GHASP commented that on page 136 of the proposal, emission reductions from RFG from 1995 have not been included.

Credits for RFG are taken on a one time basis. Credit for RFG was taken for emissions reductions from the introduction of RFG in January 1995 through November 15, 1996. Emission reductions were credited to the HGA area for the RFG program in 1995 in this manner.

GHASP expressed concern that in some cases staff was unable to quantify VOC emission reductions expected from the implementation of MACT standards.

The staff worked from the best information available. The MACT standards are only partially developed, which limits the ability to quantify reductions. The task is also complex because MACT standards target HAPs, rather than VOCs, and reduction estimates made by EPA in their rule development may not address VOC reductions. Further, the emissions inventory process is newer and less established for HAPS than VOCs, which also limits and complicates the task of quantifying reductions. In most cases, the controls used to limit HAP emissions will achieve reduction of VOCs within that same controlled stream. It is not known, though, the number or proportion of VOC streams within a given facility that will be targeted by a MACT standard. Making generalizations about facilities is difficult, even within a source category, since they vary significantly in their processes and in the way in which they comply with the various MACTs. Furthermore, a facility may comply with a MACT by substituting non-HAP VOCs in place of HAP-VOCs, so that there could be no net reduction in VOC emissions.

GHASP commented that the area within 100 km of the HGA ozone nonattainment area is much more rural, stated that the commission is short on personnel, and questioned who will enforce rules within this area.

Commission rules are enforced by regional office staff and, in some cases, also by city and county air pollution control programs. Inspections are prioritized by criteria which targets the facilities most in need of inspections. When regional office staff confirm non-clerical violations, enforcement action is initiated as appropriate.

GHASP commented that the SIP does not even speak to transportation problems. For instance, Metro is proposing allowing less than three people for the High Occupancy Vehicle lane on the Katy Freeway which will be a loss in emissions reductions. This deficit needs to be subtracted out. GHASP believes that freeway expansions like the EastTex freeway and proposed new freeways like the Grand Parkway and I-69 will cause more emissions, but the commission does not even state how it will handle this expansion problem.

Proposed major transportation projects have been included in the on-road mobile source modeling used in the SIP. Once a motor vehicle emission budget is established from the SIP, the transportation conformity process will ensure that on-road mobile source emissions do not exceed the motor vehicle emission budget. Failure to demonstrate transportation conformity results in the loss of Federal Highway Administration and Federal Transit Authority construction funding. This serves as a powerful incentive to select transportation projects which have a positive impact on air quality and which allow the nonattainment area to meet the motor vehicle emission budget.

GHASP commented that the SIP does not respond to the fact that the Houston area is starting to overtake Los Angeles for highest concentration of ozone in the nation.

The commission believes that both Los Angeles and Houston have difficult air quality problems, and that significant reductions will have to take place in both areas to attain the ozone standard. The commission believes that steady progress has been made in the HGA area, and will continue to make further progress. However, the commission believes that ozone formation is highly

dependent on meteorology and that it is not appropriate to draw conclusions based on one year's worth of data taken in isolation.

GHASP commented that they are resubmitting their report called *Clear Blue Skies*, which was published in the early 1990's. They ask the commission to consider their recommendations and address them in this SIP.

The commission has received this document, and will consider it as part of the control strategy selection process over the next two years. The commission looks forward to working with the commenter and others to help prepare as much information as possible about the various control strategies under consideration to assist in making control strategy selections and developing rules.

Keco R. & D., Inc. (Keco) suggested requiring the installation of continuous on-line analyzers to measure VOC in cooling tower water resulting from heat exchanger leaks.

Heat exchanger leaks into cooling tower water can result in significant VOC emissions if the leaks are not detected and repaired in a reasonable amount of time. While this SIP revision does not include the proposal of specific rules, rules will be developed in the future to implement the SIP, and the suggested control option will be considered at that time.

LWV commented that they were very surprised that the commission offered no specific proposals to begin the discussion of potential local options. They believe that this process will encourage comments from specific segments of the public, instead of all segments of the public. The LWV looks forward to

receiving information about a wide range of potential controls and to the opportunity to comment on them.

The commission believed that it was appropriate to stimulate public discussion of the best local control strategies for the HGA area by leaving the local options section for public comment. During the public comment process, the commission received testimony from individuals, local government entities, public interest groups such as the LWV, industry, small business, and the academic community, which represents a wide range of interests and expertise. The commission will be glad to work with the commenter and other affected stakeholders to develop the best control strategy for the HGA area.

LWV supports early public notification about pending air quality issues and proposals, and requests that the commission involve the public in the controls strategy selection and development process.

The commission agrees with the commenter, and will make every effort to involve the public and all affected stakeholders in upcoming discussions. The commission believes that the Clean Air Strategy, Town Hall Meetings, HGA public hearings, and attendant media attention have focused public attention on the task at hand, and the solutions that the commission envisions to improve air quality for the entire eastern half of the state.

LWV commented that air pollution is a regional problem. They suggested that NO_x and VOC emissions from point sources are being addressed on a regional level, and that mobile sources should be as well.

The commission agrees. Therefore, during the NLEV in the Northeast debate earlier this year, the commission voiced support for the program for Texas. Also, the commission has as a part of its Texas Clean Air Strategy that the entire eastern half of the state should use a cleaner burning fuel, such as reformulated gasoline. The commission believes that these approaches, combined with appropriate local actions in the HGA area, will result in improved air quality for all Texans.

LWV commented that they support the new research efforts in assessing public health impacts and prioritizing control strategies by considering the strategies which control the most harmful of the pollutants, such as VOCs or NO_x.

The commission agrees with the commenter, and hopes that the HAXL program will provide this type of information to be used in future decision-making.

LWV commented that costs and health benefits should be considered in the control strategy selection process.

The commission agrees, and will work with the commenter and other stakeholders to evaluate potential control strategies based on a variety of criteria.

An individual, MTC, and the H-GAC BOD commented that the SIP only discusses the control options that affect industry and larger business as well as some anticipated new federal control standards. The commenter believes that the SIP avoids discussing any control options that would directly regulate members of the general public.

The commission disagrees with the commenters. The commission has announced a comprehensive, common-sense reduction strategy for the eastern half of the state that will reduce ozone levels and that touches every sector of the emissions inventory. The commission also believes that federal measures make sense for certain types of sources that are more effectively controlled on a national level. The commission proposed a SIP quantifying known federal and state measures, and asked local citizens and stakeholders to suggest additional control measures that they were interested in exploring for possible future measures. The proposal was structured this way to begin to allow the local areas to provide more input into the types of programs that they would like to see implemented in their area because the commission believes that there is an appropriate role for local governments and entities to provide in the decision-making process, and that many control strategies will not succeed unless there is broad-based local support for them.

An individual commented that the control options that are discussed in the SIP will not be enough for the HGA area to comply with the federal ozone standard. This individual believes that by not including even a superficial discussion of the local options in the proposed SIP, the commission has in effect hidden the bad news from the general public.

The commission was not attempting to hide any information from the general public. The purpose of this SIP was to begin to lay out the level of reductions needed to attain the 1-hour ozone standard in the HGA area, and to begin the dialogue of what control strategies could best achieve that level of reductions.

An individual commented that the commission should educate the public about the true nature of air quality in the HGA area, the actual health risks that exist due to this air quality, and the costs and other adverse impacts that the public will have to pay to attain the ozone standards.

The commission agrees with the commenter, and is working to increase accurate public awareness. The control strategy selection process should afford the commission, stakeholders, and the public an opportunity to debate these issues.

An individual commented that with this SIP proposal, the commission has squandered an opportunity to explain to the general public the complete picture of what will be required to comply with the federal ozone standards and the various options to consider for getting there.

The commission disagrees. The commission believes that the format of the SIP proposal sparked public debate on the complete picture of what will be required to comply with federal standards. The commission also believes that the format of the SIP proposal leaves the maximum flexibility for the local area to be part of the decision-making process about which rules make sense to implement in the HGA area.

SCAQC commented that they applaud the commission for its foresight in proposing the regional approach that seeks to prevent pollution levels from rising in the currently marginally clean areas.

The commission appreciates the support, and believes that air quality benefits from the Texas Clean Air Strategy will extend to all current nonattainment and near-nonattainment areas as well.

SCAQC commented that the HGA SIP is essentially no plan at all, but simply a listing of the target, the calculations made, and vague estimates of levels of control. SCAQC believes that this fails to fulfill the requirements stated by EPA as a "list of control measures". They also commented that the quantification of reductions in the SIP is too broad and may include double counting.

The commission believes that the proposal does fulfill the requirements of the IIG, which calls for: "a list of measures and regulations and/or a strategy including technology forcing controls needed to meet ROP requirements and attain the 1-hour NAAQS." The SIP contains such a list. The quantifications are only approximations because emissions reductions cannot be finally quantified until a specific rule has been written and negotiated. States are not required to adopt rules for this SIP, but rather are required to have adopted rules by the end of the year 2000. When those rules are written, the commission will ensure that no reductions are double-counted.

SCAQC commented that clean diesel fuel, a stronger alternative fuel program, and innovative initiatives will be needed to achieve the reductions needed to attain the health standard.

The commission will work with the commenter and other stakeholders to evaluate these and other control strategy suggestions for inclusion in the final Houston Attainment Demonstration due by the end of 2000.

An individual commented that emissions banking and trading is an unacceptable method for reducing air pollution, on account of potential health impacts in the vicinity of a source which has purchased emission credits instead of reducing its emissions.

The agency places great emphasis on ensuring that trading does not create or worsen air pollution problems in the vicinity of sources using trading as a compliance alternative. The agency's Emissions Credit Banking and Trading rule, adopted in December of 1997, contains several safeguards which protect against localized effects from trading, and which authorize the agency to suspend or even discontinue trading if serious problems are encountered.

SC stated that innovative technology, such as low temperature oxidation, biological controls, and creative regulation of operations to reduce use of flares and incinerators should be considered.

A review of the commission attainment modeling inventory, which includes COAST data, revealed that NO_x emissions from flares represent only 0.30% of the total point source NO_x emissions. Likewise, NO_x emissions from incinerators used as VOC control devices represent only 0.11% of the total point source NO_x emissions. These NO_x emission levels are insignificant. Nevertheless, the Chapter 115 VOC rules allow alternate methods of control when the emission reductions are demonstrated to be substantially equivalent. Also, some Chapter 115 rules include control efficiencies which are lower than can be achieved by a typical combustion control device. This provides flexibility for the use of process control and non-combustion control devices in order to minimize NO_x emissions.

SC commented that "it is apparent that there are major problems with the UAM as applied by the commission", and that "there are also major problems with the emissions inventory since the commission had to artificially inflate VOC inputs for the scenarios to work properly".

The commission agrees that photochemical modeling for the Texas Gulf Coast has proven to be an extraordinarily difficult task. The complex coastal meteorology combined with a unique mix of emission sources has made modeling the region especially challenging. Some episodes, notably the August 17-20, 1993 period, have not been usable, despite considerable efforts by staff and by outside experts. The commission plans to continue to study the situation along the Texas Coast and to improve its modeling methodologies. Despite the difficulties with some episodes, however, very good model performance was obtained with the September 8-11, 1993 episode, the one upon which reduction targets for this SIP proposal are based.

The commenter is mistaken in the assertion that the commission had to artificially inflate VOC inputs for the scenarios to work properly. The base inventory used in the modeling for the September 8-11, 1993 episode was not modified. The alternative inventories were developed to test the sensitivity of the model results to changes in the input, but do not serve as a substitute for the base inventory. In fact, the modeling using the unmodified base inventory performed better than did modeling using either alternative inventory.

SCAQC commented that the HAXL group has endorsed the importance of toxic emissions reductions and particulate reductions as an approach to maximizing public health benefit as the program to reduce ozone progresses. The commenter asks that the commission pay attention to this articulated community priority to reduce toxic VOCs as an early portion of VOC reductions.

While the commission has endorsed the concept of the HAXL program, there are as yet no study results on which to base decisions about choice of control strategies. The commission believes that the efforts now underway to reduce toxic emissions through programs like the MACT standards,

and the Urban Area Source Toxics Program, will ensure that toxic emissions continue to be reduced in the HGA area and statewide.

SCAQC commented that it is "in the public health interest to proceed as rapidly as possible and in the political interest to avoid EPA disapproval and sanctions."

The commission agrees and believes that the upcoming implementation of NO_x RACT, the proactive Texas Clean Air Strategy, and the rapid response to EPA's proposed Post-96 SIP disapproval all are serving to improve air quality and remedy deficiencies as soon as possible.

H-GAC staff noted a difference in vehicle miles traveled (VMT) in Appendix 9c-D (D-24). Also, H-GAC questioned the on-road mobile source control strategy calculations contained in the main body of the SIP (pp. 137-140). H-GAC also commented that if Table 16 is intended to show emissions levels that reflect the control strategy scenario, the estimates appear to be too high.

The Texas Transportation Institute (TTI) prepared the original COAST emissions inventory in 1993-1994 for the 8-county Houston nonattainment area using the H-GAC's travel demand model output and some seasonal and Highway Performance Monitoring System adjustments. The travel demand model has been significantly updated since that time. The agency agrees that the newer VMT estimates should be closer to 140 million VMT. The agency is considering re-modeling the region for the attainment SIP due by the end of the year 2000, which would include use of the latest travel demand model available for the planning area.

The COAST's mobile source inventory does not include the effects of I/M or reformulated gasoline, so its levels are higher than what would be normally expected. On-road mobile source emissions and emission reductions are based on a VMT in excess of 140 million miles per day. Mobile source emissions and emission reductions are directly based on grams per mile emitted by vehicles. Higher miles per day will produce higher emissions and thus have the potential for higher emission reductions. These figures will be reduced when lower VMT estimates are modeled. Table 16 includes the effect of the Federal Motor Vehicle Control Program (FMVCP) for new car standards including "Tier I" standards, gasoline vapor rules implemented in 1992, as well as the anti-tampering program for Harris County. The SIP language is being further revised to remove any possible ambiguity about the controls included in Table 16.

H-GAC disagreed with the projections made by the commission in Table 16 of the draft. H-GAC staff commented that their projections which state that combined I/M and RFG VOC reductions will be lower are more accurate.

The commission believes that the control strategy values (e.g., 75 tons of VOC per day) estimated by staff are only for the sake of discussion, since the COAST did not specifically include reductions from I/M or RFG. The new modeling being considered for the year 2000 would include a comparison of no-controls with controls (FMVCP, I/M, and RFG) as well as other programs such as the NLEV program. The agency plans to coordinate the methodologies with H-GAC to ensure that the outcomes are consistent.

H-GAC staff commented that regarding "local control options", H-GAC has formally committed to TCMs in the SIP in years after 1999 that are not reflected in the Attainment Demonstration proposal.

A copy of the commitment letter was attached to their comments. As a result of continuing confusion caused by the EPA's planned disapproval of the TCM rule, H-GAC must make contingent recommendations regarding the TCMs. If resolution of EPA's concerns can be achieved before the close of commission's response to comments period, the TCMs should be included in the SIP. If EPA reverts to opposing the Texas approach to TCMs (using categories and magnitudes rather than the project-by-project commitment favored by EPA), H-GAC must withdraw the TCMs for the years after 1999 from the SIP. The H-GAC opposes project-by-project commitment, because the vagaries of the construction process may affect individual projects while leaving the total number of projects completed unchanged.

EPA has stated in a September 8, 1997 letter to Chairman McBee that the SIP should include a detailed description of each TCM project including project description, emission reductions and schedule for completion. In addition, EPA comments on this proposed SIP contain the same comments. The commission has initiated stakeholder meetings to develop a flexible process for TCM substitution but will not complete this process by the close of response to comments.

H-GAC urged the commission to be careful in the attainment demonstration to avoid actions that could inadvertently imply that on-road mobile source emissions budgets are being established for any year beyond 1999.

The commission agrees with the commenter. The Post-96 9% SIP will establish a budget for the HGA area. However, the commission does not believe that a budget for any year beyond 1999 is established by this SIP. A budget may be established by the revision to the SIP that is due by the end of 2000.

H-GAC commented that the commission should revise terminology in the proposed SIP revision that reports "best case" and worst case" to say "minimum" and "maximum" emission reductions, as the current language implies a value judgement.

The commission disagrees with the commenter and will not make the suggested revisions. Clearly, if attainment can be achieved with less emission reductions (and therefore less cost and lifestyle impacts) it is better than if it takes more reductions.

H-GAC commented that the proposed SIP revision contains references to on-road mobile, non-road mobile, and area sources that are not consistent between modeling and control approach development, and requested that references be checked for consistency.

The commission appreciates the suggestion, and will check these descriptions for consistency.

Temple-Inland commented that the commission had not proved the case for the regional Texas Clean Air Strategy. Specifically, they said that there was insufficient justification for:

- making regional emission reductions,
- describing public health and welfare benefits resulting from the reductions,
- characterizing the technical feasibility of NO_x reductions from the range of emission units that their facilities would have to control,
- not using a complete and accurate emissions inventories, and
- rushing into the idea of "control for control's sake".

The commission has not made any final decisions about exactly which point source strategies should be implemented as part of the Texas Clean Air Strategy. The commission will work with the commenter and all affected stakeholders as they review potential rules for the regional strategy. However, this particular SIP is designed to begin the dialogue on the control strategy selection and development for the HGA area. Therefore, these comments are not incorporated into this SIP revision.

Temple-Inland recommended that the commission perform an emissions inventory update, because many of their operating facilities have modernized in the 1990s and may now have less emissions.

The 1990 inventory is the baseline inventory. The addition of new abatement devices since 1990 is reflected in the actual 1996 inventory whenever these additions are made by companies during the inventory process. These new emissions levels as reflected are included in the model and in the rule effectiveness values used and reported to EPA.

Temple-Inland commented that the commission should use case-by-case feasibility and cost effectiveness analysis for individual units. They believe that no source should be expected to pay more per ton of NO_x reduced than would an electric utility source that also impacts the nonattainment area.

The commission believes that there may be alternative methods to assess cost-effectiveness of a particular control strategy. However, the purpose of this SIP revision is not to select control strategies. The commission will work with the commenter and other stakeholders to develop appropriate selection criteria including cost-effectiveness during the strategy selection and development process.

Central and Southwest Services, (CSW) Inc., and Alcoa commented that emission reductions from potential perimeter county point source controls listed in Table 32 are not relevant toward meeting the emission reduction targets given in Table 30. This commenter encouraged the commission to clarify the relevance of regional emission reductions toward meeting the SIP's emission reduction targets.

The commission believes that the commenter is correct in noting that the emission reduction target as listed in Table 30 of the proposed SIP revision pertains to emission reductions inside the nonattainment area. However, the commission believes that regional emission reductions will be beneficial toward attaining the ozone standard in the HGA area and that the current lack of an appropriate accounting mechanism for considering these reductions should not preclude them from consideration.

CSW, Alcoa, HL&P, TABCC, and the Angelina County Chamber of Commerce (ACCC) commented that the model results presented in the proposed SIP revision do not support a regional control strategy. CSW noted that the model results presented in the proposed SIP revision show that regional implementation of the Ozone Transport Assessment Group (OTAG) 5c strategy (consisting of a 60% reduction in elevated NO_x emissions, 30% reduction in low level NO_x emissions, and 30% VOC emissions) would reduce the level of NO_x reductions needed inside the HGA to reach attainment by only 3% to 5%. Alcoa commented that neither prevailing wind directions nor OTAG provide support for the commission's regional strategy.

The modeling results indicate that significant emissions reductions from within the HGA area, plus reductions from the regional strategy, will be necessary to demonstrate the most effective and efficient means to achieve attainment. The commission believes that the model results indicate

that the strategy is directionally correct, and that regional reductions will be effective in helping reduce ozone in the HGA area. However, the commission believes that there was sufficient justification to lay out such an approach in the Texas Clean Air Strategy, and will perform additional control strategy testing and other lines of analysis before any regulations are adopted.

CSW and Alcoa commented that regional controls would not be cost-effective toward attaining the ozone standard in the HGA area. CSW estimated that regional controls would be roughly 16 times less cost efficient towards attaining the 1-hour ozone National Ambient Air Quality Standard (NAAQS) in HGA than incremental controls implemented inside the nonattainment area.

The purpose of the regional strategy is to reduce emissions across the entire eastern half of the state, thus bringing air quality improvements to all current and future 8-hour nonattainment areas within the eastern portion of the state. The commission believes that it is not necessary or even appropriate to judge the cost-effectiveness of a regional strategy by its benefit to only one area.

The TABCC commented that the commission should include reductions from mobile sources in the proposed SIP revisions. They assert that the commission's own data suggests that emission reductions from point sources alone will not be sufficient to reach attainment, especially for NO_x.

The commission agrees that reductions from all source categories will be necessary to attain the standard in the HGA area. That is one reason that the regional Clean Air Strategy includes measures that will reduce VOC and NO_x emissions from point, area, on-road and non-road mobile sources.

The TABCC commented that they look forward to working with the commission on a voluntary program to implement reformulated gasoline in the perimeter counties, pending resolution of the uncertainties relating to the agency's legal authority to implement the program.

The commission looks forward to working with the commenter and other affected stakeholders.

The City of Houston (COH) commented that they support thoughtful and practical actions that bring about significant reductions in the region's ozone levels. The COH commented that it is imperative that the commission put together a serious plan to achieve a 65% reduction in NO_x levels by 2007, if it is feasible to do so. Furthermore, they commented that it is important to work together in the very near term to develop and finalize an exhaustive and comprehensive list of specific control measures to be implemented in the HGA area over the next ten years.

The commission agrees with the commenter.

COH expressed support to the commission and its staff for the thoughtful and comprehensive framework that has been established to guide the development of air quality policies in the future. However, they believe that the broader geographic focus is not a substitute for real pollution reductions within the HGA region.

The commission appreciates the support and concurs with the commenter that pollution reductions within the HGA region will be crucial in attaining the standard in the area. However, the commission believes that a regional strategy will improve air quality in the entire eastern half of the state, and will be necessary to demonstrate the most effective and efficient means to achieve attainment.

COH appreciated the inclusion of the HAXL project in the HGA SIP, and they commented that implementation of the HAXL approach will bring about significant health benefits to citizens of the HGA area.

The commission appreciates the support and also believes that HAXL can help the state to better understand health risks of various pollutants in the HGA area, so as to prioritize reductions to obtain the maximum health benefits in the most cost-effective manner possible.

COH commented that the Attainment Demonstration SIP to be developed by the end of 2000 should be built around several key principles.

The commission agrees with the comments, and will incorporate them into the control strategy section of the SIP as part of the local option section of the SIP, and will consider these comments as the control strategy selection portion of the SIP is developed.

COH suggested that the following control strategies should be developed for future SIP revisions in the HGA area:

- Large stationary sources that have been permitted by the commission should install pollution control equipment to reduce their NO_x levels by at least another 65%.
- Additionally, grandfathered facilities should install the same type of pollution control equipment to reduce their NO_x levels that permitted facilities will be installing.
- The commission should place a priority on reducing benzene and other toxic compounds as part of the VOC reduction plan.

- Support for the Regional Strategy to reduce NO_x emissions from stationary sources in the surrounding counties. However, these reductions should not be a substitute for emissions reductions within the HGA region.
- The existing I/M program should be extended to all of the counties included in the HGA nonattainment area (all 8 counties).
- The I/M program should be strengthened to include a NO_x screening component.
- The I/M program should also be expanded to include all vehicles fueled by diesel because of the relatively high levels of NO_x emissions from such vehicles.
- The second phase of RFG should be developed and marketed on an accelerated basis. This gasoline should be designed so that fine particle emissions are minimized.
- This cleaner burning gasoline should be implemented in the surrounding counties.
- The NLEV Program should be implemented as quickly as possible.
- A cleaner burning diesel fuel that reduces NO_x emissions as well as fine particle precursors should be mandated.
- The commission should develop and implement the regulations that are needed to significantly reduce NO_x from off-road mobile sources.
- A "hot"spot" strategy should be developed for the SIP.

The commission has quantified as many as possible of the emissions reductions that could be obtained from these programs and has included them in the local options section. The commission will work with the commenter and other local stakeholders to ensure that every potentially viable option is given consideration for adoption as a strategy for the HGA area.

COH commented that pollution levels are not evenly distributed throughout the Houston region. COH recommends that a "hot spot" strategy be included in the Attainment Demonstration SIP and developed as an implementation strategy in the SIP that will be finalized in 2000.

The commission believes that the SIP development process takes into account "hot spots". Attainment of the one hour standard entails reducing ozone "peaks", or hot spots that can occur in a limited geographic area, sometimes at just one monitor. The urban airshed modeling that the commission has performed is designed to predict the levels of NO_x and VOC reductions that will be effective in reducing the peak, or hot spot. The control strategy testing and evaluation will also be targeting reduction of that peak.

H-GAC BOD commended the commission's significant efforts toward this initial phase of a plan to attain the national ozone standards. They commented that they were pleased that the commission's plan addresses federal measures such as on-road and non-road heavy duty diesel standards, reformulated gasoline, and state measures like the NLEV program, point source combustion modifications, and reformulated gasoline for non-road mobile sources.

The commission appreciates the support.

H-GAC BOD commented that it will be important to quantify benefits and costs of this proposal and its contribution toward the region's attaining the standard.

The commission agrees, and will work with the commenter and other affected stakeholders during the strategy selection and development process to address these concerns.

H-GAC BOD strongly urged the commission to work with EPA to avoid any imposition of sanctions on the HGA area.

The commission agrees with the commenter, and has worked with EPA to resolve the deficiencies that EPA noted in their proposed disapproval of the Post-96 ROP SIP.

H-GAC BOD adopted a set of policies that they believe should guide the commission as it enters the control strategy selection and development phase.

The commission has incorporated the policies suggested by the H-GAC BOD into the local options discussion of the SIP, and will use them during the control strategy selection and development phase.

ACCC commented that the commission should carefully consider the social and economic impact of the proposed state regional strategy on counties within the affected area. They believe that both existing and future industries within the zone for potential controls could be subject to expensive controls whose real benefit to the HGA ozone problem are unclear.

The modeling results indicate that significant emissions reductions from within the HGA area, plus reductions from the regional strategy, will be necessary to demonstrate the most effective and efficient means to achieve attainment. The commission believes that the model results indicate that the strategy is directionally correct, and that regional reductions will be effective in helping reduce ozone in the HGA area. However, the purpose of the regional strategy is to reduce emissions across the entire eastern half of the state, thus bringing air quality improvements to all current and future nonattainment areas within that portion of the state. The commission believes

that there was sufficient justification to lay out such an approach in the Texas Clean Air Strategy, and will perform additional control strategy testing and other lines of analysis before any regulations are adopted. The commission believes that it is not necessary or even appropriate to judge the cost-effectiveness of a regional strategy by its benefit to only one area.

MTC and HL&P commented that the commission should explain if it is feasible to test whether the overall control strategy is working with a mid-course review. For example, the SIP indicates that the benefits of NO_x controls will not be seen until NO_x is reduced by 50% or more. They assert that this represents an investment of hundreds of millions of dollars without any verification whether the strategy is working or not. They recommended that an in-depth examination of the feasibility of conducting a mid-course review of overall control effectiveness should be undertaken. If found feasible, the review should be made to determine how to adjust the control strategy to minimize risk.

The commission agrees with the importance of conducting a mid-course evaluation. The commission plans to conduct this evaluation as the state prepares the HGA 8-hour ozone control strategy in the year 2003. The compliance date for many of the major point source rules will likely be 2003, so the commission will have a chance to evaluate their effectiveness before the 2007 attainment date, and will be able to add additional controls if the mid-course evaluation warrants it.

The TCC commented that the commission should clarify that it has no intention of defining perimeter counties as nonattainment areas or imposing on them any of the other incidents of nonattainment status.

The commission is following EPA's IIG, which allows areas to take credit for emission reductions made in specific areas outside the 8-county ozone nonattainment area. Neither this EPA policy nor the commission envisions that these areas are considered to be nonattainment areas, or that other nonattainment provisions would pertain to these areas.

The Texas Automobile Dealers Association (TADA) supported the proposed revisions to the HGA SIP.

The commission appreciates the support.

TADA encouraged the commission to thoroughly evaluate the effectiveness of control measures such as Stage I vapor recovery, Stage II vapor recovery, and VOC RACT in the perimeter counties.
The commission will consider these comments during the control strategy selection and development phase.

TADA hoped that the commission would discard as unfeasible, impractical, and ineffective, calls to: restrict business and plant operation, implement enhanced emissions testing, no-drive days, or mandate the sale of zero emission vehicles.

The commission has not proposed any of these programs, but will consider local option suggestions with broad-based local support. The commission will work with the commenter and other interested stakeholders to ensure that the final selected control strategies are effective in reducing ozone in the HGA area and make sense.

The Environmental Defense Fund (EDF) commented that the following control strategies should be considered among those that are analyzed for inclusion into the SIP:

- expanded I/M vehicle programs
- accelerated vehicle retirement, or "cash for clunkers"
- market-based transportation policies, including "congestion pricing" which discourages vehicle use during peak traffic times, and
- alternative fuels.

The commission appreciates the comments and will consider them during the control strategy selection and development phase which will occur over the next two and one-half years. The commission looks forward to working with the commenter and other affected stakeholders during this time.

EDF strongly urged the commission to consider the impacts of potential legislation to restructure the Texas electric utility industry.

The commission believes that it is premature to speculate on the effects of electric utility industry restructuring. For programs such as the grandfathered emission reductions program and HAXL, although they are not fully fleshed out, they are expected to achieve emission reductions. If electric utility restructuring occurs, it is not known whether reductions or increases in emissions could occur. Therefore, the commission could not be sure that projections were even directionally correct. Future emissions inventories will take whatever changes occur into account.

EDF expressed support for flexible market-based systems such as emissions budgets and "cap and allocation" systems, stating that such programs achieve necessary emission reductions at the lowest possible cost.

The staff appreciates the support, and welcomes input concerning workable, effective approaches to implementing flexible market-based systems.

EPA commented that their "review of the commission's modeling conducted in support of this attainment demonstration found the modeling to have been technically conducted according to EPA procedures and recommendations. In fact, for some technical procedures, the commission used applications which exceeded EPA requirements."

The commission appreciates the comment.

EPA commented that the threshold for determining a "significant" NO_x disbenefit should be based on the uncertainties of the model, not the round-off tolerance of the standard, and that these uncertainties argue for consideration of additional VOC reductions to best ensure public health protection. The statement is also made that a 20% reduction in VOC emissions results in no NO_x disbenefit.

The commission chose to define a "significant" NO_x disbenefit based on the round-off tolerance of the standard rather than on the uncertainties of the photochemical model because the former is well-quantified, while the latter is not. Further, even if one could quantify the accuracy of the model, it is unclear how such a number would be used in this context.

The EPA is incorrect in its assertion that no NO_x disbenefit is seen when a 20% reduction in VOC emissions are made. For the case of 20% reduction in VOC emissions, Table 26 shows a 1.2 parts per billion disbenefit (relative to the case of no reductions) at a level of 30% NO_x reduction.

It should be noted that although the modeling submitted in this SIP indicates that a 15% reduction in VOC emissions is sufficient to mitigate the effects of a NO_x disbenefit, the commission expects VOC reductions beyond this level to occur over the next several years.

EPA commented that the alternative inventories should be used to determine the required levels of VOC reductions to mitigate NO_x disbenefits associated with these inventories. EPA also noted that Alternative I should have a smaller VOC/NO_x ratio than the base inventory.

While it is true that domain-wide, Alternative Inventory I has a smaller VOC/NO_x ratio than the base (due to the large amount of vegetation in rural areas of the domain), the converse is true in the urbanized areas of the HGA region, where anthropogenic VOC emissions are dominant. The anthropogenic VOC/NO_x ratio in the HGA area with either Alternative Inventory I or II is more than twice as high as the base.

With both Alternatives I and II, there is no NO_x disbenefit seen in Figures 38 and 39 for September 8 (similar results are seen for the three remaining episode days). This is likely due to the Alternative Inventories' high VOC/NO_x ratios in the urban areas. Therefore, no additional VOC reductions would be necessary to mitigate NO_x disbenefits with either alternative.

EPA commented that Alternative Inventory II is more realistic than Alternative I, and should be used to develop a "best case" set of reduction levels. The justification provided for EPA's assessment was that model performance using Alternative I is not as good as that obtained using the base inventory.

The only difference between Alternative Inventories I and II is the treatment of biogenic emissions. The ambient measurements of isoprene made at two urban sites in Houston suggest an overestimation of biogenic emissions by as much as 70%, which is the assumption of Alternative I. Although there is reason to believe that the actual overestimation of biogenics may be considerably lower than 70% (as is assumed with Alternative II), the commission considers 70% to represent the upper end of the range of possible overestimation, hence Alternative I constitutes the "best case".

It is true that model performance with Alternative I is not as good as with the base inventory or with Alternative II. While the commission believes that model sensitivity analyses (such as those conducted with Alternatives I and II) provide guidance into what areas of the emissions inventory need to be investigated, the commission does not believe that model performance, based on the results of sensitivity analyses, is sufficient to assess the suitability of the inventory for use in photochemical modeling.

EPA commented that the regional strategy reductions appear to reduce the level of required local NO_x reductions by about 3%, instead of the 5% used in the SIP calculations. This would change the required reduction, relative to the 2007 projected emissions inventory, from 67% to 69%.

In the section "Lower Bound on Required NO_x reductions", the commission states that the modeling indicates that reduction targets may be reduced by 3 to 5% or more. Using the lower end of this range would yield the reduction requirement stated by EPA. However, the commission does not believe that this change is significant relative to the large reduction requirement indicated by the model and considering the uncertainties inherent in the modeling process. The commission plans to perform more detailed modeling analyses to determine more precisely the actual reduction requirements.

EPA commented that there is no documentation related to accessibility to key electronic input data bases/information used in the SIP modeling, as recommended in the EPA guidance on Urban Airshed Model Reporting Requirements for Attainment Demonstration. EPA also commented that the SIP document should provide instructions and assistance for reviewing agencies to access the electronic files, and that a contact person to assist with obtaining information should be identified.

Regarding the comments on documentation related to accessibility to electronic input data bases/information, and a contact person for the electronic files, the commenter is mistaken. This information is provided on page 223 of the proposal, and in the table of appendices. The proposal indicates the commission staff contact for obtaining electronic modeling files. A phone number and e-mail address are given. Regarding the comment that the SIP document should provide instructions and assistance for reviewing agencies to access the electronic files, the SIP document will be updated to include a commission File Transfer Protocol site address and directory, and will indicate that assistance with resolving any file access difficulties will be provided by commission staff.

EPA commented on a sentence in the proposal under "Additional Considerations" of the "Modeling Episode Selection" section on page 44. The sentence indicated that "Selecting longer episodes provided additional benefits by allowing model performance statistics to be calculated over several days." EPA interpreted the statement to mean that performance statistics would be calculated for periods inclusive of several days, and noted that this would be inappropriate.

The commission's intention was to convey that longer episodes provided benefits by allowing several days of model performance statistics to be calculated and compared *individually* to EPA performance criteria. Doing so would provide a means for assessing the consistency of model performance during the episodes. The SIP document will be updated to clarify this issue.

The EPA commented that, under the "Ozone Time Series" discussion on page 95 of the proposal, the unsuitability of the comparison between monitored versus modeled ozone and precursor results may be overstated. EPA commented that the commission's argument would apply only when UAM-IV modeling analyses were conducted because the layers used in UAM-IV analyses are much bigger than those in UAM-V analyses.

The commission does not agree that the difficulty with comparisons is applicable only to UAM-IV. We believe it is applicable to UAM-V, although probably not to as great an extent as with UAM-IV. The caveat which notes the difficulty of comparing monitoring and modeled results for ozone precursors will be retained, but a clarification will be added which explains that the "level of incommensurability" between the monitored and modeled values of ozone precursors may not be as great with UAM-V as it would be for UAM-IV.

EPA commented on Table 18 (Area Source Control Factors By County/Region and ASC) and stated that it was unclear if the calculation technique used to estimate auto refinishing emissions was consistent with the technique used in the 15% Rate-of-Progress (ROP) SIP. The EPA stated that auto refinishing emissions were calculated for the 15% ROP SIP using actual paint and solvent usage for 1993, and that because the solvent usage was reduced as a result of the commission auto refinishing rules, no additional reductions were projected for the forthcoming national rule.

In the 15% ROP SIP (as revised on July 24, 1996), auto refinishing emissions were estimated using the results of bottom-up surveys conducted in the fall of 1995. The bottom-up surveys revealed a decrease in auto refinishing emissions due to such factors as improved original equipment manufacturer (OEM) coating applications (thus reducing the number of vehicles being repainted due to OEM paint failure), smaller cars, use of anti-corrosion primers by OEM, anti-lock brakes, etc. These reductions predate the commission auto refinishing rules which were adopted on November 10, 1993 and had a compliance date of July 31, 1994.

Controls that took effect before September 1993 were assumed to have been in effect during the base case episode and were specifically excluded from the list of controls applied in Table 18. Auto refinishing was included in Table 18 because the commission auto refinishing rules have a compliance date after September 1993. These rules are estimated to achieve a 40% reduction in VOC emissions from auto body shops by requiring improved transfer efficiency, gun cleaners, and VOC limits on various auto refinishing coatings. The national auto refinishing coatings rule which the EPA intends to issue under the FCAA, §183(e), is estimated to result in a 37% reduction in VOC emissions. The commission has not taken additional emission reductions for the forthcoming national rule since the state rule results in slightly greater emission reductions.

EPA questioned why major source bakeries are included in the area source table, and stated that these bakeries should be included in the point source inventory. EPA also commented that the control efficiency of the Texas rule is 30%, while the control factor in the table is 0.2987, indicating a control efficiency of 70%.

Major source bakeries were included in the area source table because the four bakeries in Harris County that were large enough to have reported as point sources initially had not submitted emissions inventories, and therefore the emissions were reported as area source emissions. Subsequently, the bakeries submitted point source emissions inventories. The commission agrees that the major source bakery emissions should now be counted as point source emissions rather than area source emissions. Therefore, the major source bakeries category has been deleted from Table 18. Because this category is being deleted, there is no need to adjust the control factor.

EPA commented that it was their understanding that the 15% ROP SIP and the 1990 base year emissions inventory do not include any emissions from sheet/strip/coil coating, based on a survey of the trade associations.

The EPA's understanding is correct. There are no area source emissions associated with sheet/strip/coil coating because all emissions were accounted for in the point source inventory. Therefore, the sheet/strip/coil coating category has been deleted from Table 18.

EPA commented that it is unclear over what area the metrics described in the section "Lower Bound on Required NO_x reductions" were calculated. Since the modeling indicates that emissions within the

8-county nonattainment area result in elevated ozone levels outside the 8-county area, EPA asserts that the metrics should apply to more than just the 8-county area.

As stated in the SIP proposal, the metrics presented are calculated only for the 8-county nonattainment area. However, the commission has calculated similar metrics for a variety of regions within the COAST modeling domain, and these may be obtained upon request.

EPA commented that for Figure 54 on page 214, the upper bound of the envelope of the 95% confidence limits should be below the 1-hour ozone standard in order to conclude that there is a 95% chance of attaining the standard.

While EPA's observation that "the upper bound of the envelope of the 95% confidence limits should be below the 1-hour ozone standard in order to conclude that there is a 95% chance of attaining the standard" is correct, the commission did not claim that the data indicates a 95% chance of attaining the standard. The fact that the trend line crosses the standard at around 2007 suggests about a 50% chance that the standard would be attained, assuming that the current rate of emissions reductions is maintained. However, it should be noted, as indicated on pages 199-200 of the proposal, that emission reductions expected through 2007 will be greater than those during the historical period analyzed, so the chance of attaining the standard by 2007, based on the trends analysis, is better than 50%.

EPA commented that in general, the state has not included documentation of how the emission reductions for off-road control strategies were calculated.

The commission staff calculated 2007 non-road mobile source emissions reductions according to the guidance provided in a draft Phil Lorang memo, "Calculation of 2007 and 2010 Interim Emission Inventories." Mr. Lorang, with EPA's Office of Mobile Sources (OMS) in Ann Arbor, Michigan, provided a draft memo to the states, received by the commission on January 20, 1998, that includes instructions for making inventory adjustments prior to calculation of reductions and provides the applicable VOC and NO_x percentage reductions that will be allowed. A spreadsheet showing the non-road mobile source inventories for each of the eight counties in the HGA ozone nonattainment area and the calculations to derive the emissions reductions was provided to EPA Region VI staff on March 17, 1998.

EPA commented that regarding the Proposed Non-Road Diesel Standards, Region VI staff will not require the state to make the baseline inventory adjustment because of the lack of time to incorporate such an adjustment and the fact that the memorandum is only draft at this time.

The commission staff's understanding of the December 29, 1997 Richard D. Wilson memo, "Guidance for Implementing the 1-Hour Ozone and Pre-Existing PM_{10} NAAQS," is that the Post-1996 ROP calculation tables that were included in the first iteration of the revised SIP are not actually required to be submitted until, "on or before the end of 2000." After discussions with both the EPA and Houston local area officials, the commission has decided to withdraw those tables (Tables 28 & 29, pp. 224 and 225) from the revised SIP document. The ROP tables are based on the 1990 base year inventory projected to the year 2007.

Given that background, the EPA comment relates to a situation created by the commission's having withdrawn the ROP tables. Without the ROP tables, the only emissions inventory

remaining in the revised SIP is the modeling attainment demonstration inventory. That inventory has been used by the commission to calculate the emissions reductions that may be achieved by 2007. However, the attainment demonstration inventory is based on the 1993 COAST inventory projected to the year 2007 and not on the 1990 base year inventory. The first of the recommended steps in the draft Phil Lorang memo for calculating emissions reductions for heavy duty diesel non-road equipment is that the 1990 base year inventory be adjusted upward (factors are provided for each non-road equipment major group) because EPA's OMS now believes that the original 1991 *Nonroad Engine and Vehicle Emission Study--Report* (NEVES) inventory underestimated non-road emissions from heavy duty diesel-fueled equipment. EPA's comment is that they have allowed (for this submission) the commission to apply the emissions reduction percentages that were applicable to the heavy duty diesel non-road equipment directly to the 2007 emissions inventory. The commission has done this and provided EPA Region VI (March 17, 1998) with a spreadsheet showing the emissions reductions as calculated using the New Standards Adjustment Factors shown on page 6 of the draft Phil Lorang memo. Documentation of the Regional Economic Modeling Inc./Economic Growth Analysis System growth factors used to project the inventory from 1993 to 2007 will also be provided to the EPA.

EPA commented that they will expect the state to make any adjustments recommended in future OMS guidance for the final attainment demonstration submittal for the HGA nonattainment areas due in 2000.

Following the guidance in the Wilson memo, "Guidance for Implementing the 1-Hour Ozone and Pre-Existing PM_{10} NAAQS," when the "target calculations for post-1999 ROP milestones up to the attainment date," are submitted, "on or before the end of 2000," the commission will address

the issue of adjusting the 1990 base year non-road mobile heavy-duty diesel equipment inventory upward prior to calculating 2007 emissions reductions.

The commission will use EPA guidance for the development of mobile sources as appropriate. As in the past, if the commission has better Texas-specific information for a source category, they will work with EPA to gain approval of this data.

EPA commented that the on-road mobile source emissions are not well documented. EPA believes that the commission should include model input and output files to document these reductions.

The 2007 emissions estimates that the comment refers to are contained in Tables 28 & 29, pp.224 and 225 of the proposed SIP. As is discussed in a previous comment, these ROP tables are being withdrawn from the document and this has been discussed with EPA Region VI staff. Therefore, there is no longer a need for this documentation (including electronic input and output files from MOBILE5a).

EPA commented that the documentation for the VOC numbers in Table 1 of the Post-96 ROP plan should be provided in the final SIP submittal.

The area and nonroad mobile source VOC emission growth projections from 1990 to 1999 were provided to EPA Region VI via electronic QuattroPro spreadsheet file in mid-March. Since then, adjustments were made to the surface cleaning and automobile refinishing area source categories to reflect a 1995 survey which documented lower growth trends in these categories. The revised electronic spreadsheet file will be provided to EPA at the earliest opportunity. The point source

VOC growth projections from 1990 to 1999 use the same Economic Growth Analysis System (EGAS) factor methodology as the 15% SIP. The documentation of the projected emissions and reductions for mobile sources has been provided in the final submittal as Appendix 11c-L.

The EPA commented that they question whether the commission could claim the level of credits from the gas cap check in the vehicle I/M program, which they believe may be excessive, and claimed that 0.5 tons per day of excessive VOC reductions carried forward from the 15% SIP cannot be credited to the Post-1996 SIP.

The commission staff believes that this matter may require further discussion. Staff had understood that EPA had granted conditional approval of the commission's use of National Highway Designation System Act good faith estimates. That understanding is based both on a reading of the conditional approval which may be found in the July 11, 1997 *Federal Register* notice (62 FR 37138) and on the fact that this reduction was fully documented in the 15% SIP. The 50% emission reduction credit for using the pressure test in MOBILE5a is reasonably equivalent to the full credit for the gas cap integrity test (see I/M SIP Revision, May 29, 1996, page 12).

EPA requested the commission to document for the public record what actions have been taken to ensure that the emissions inventory and emission projections for the Houston Airport System are not understated.

The 1990 base year emissions inventory for the non-road mobile source category, Commercial Aircraft, was developed using the EPA-approved Federal Aviation Administration (FAA) Aircraft Engine Emissions Database model. The primary data inputs into the model are the number of landings and takeoffs (LTOs) at the airport, the engine types of the aircraft, and the time-in-mode

(each landing-takeoff consists of five operating modes: approach, taxi/idle-in, taxi/idle-out, takeoff, and climbout). The source of data for the number of LTOs and the engine types at each airport was the FAA. The time-in-mode used was the model's default time of 26 minutes, which ordinarily would tend to overestimate the emissions unless the airport has significant delays in taxi/in and taxi/idle-out modes. Given all of this, the commission staff feels that the 1990 emissions inventory was calculated using the best information available at the time. However, the commission is responsive to concerns that emissions may be underestimated and is certainly willing to work with the HGA area airports to obtain better information to be used to develop a more accurate inventory.

In fact, prior to the receipt of comments, commission staff had already agreed, in a meeting with EPA Region VI staff on March 6, 1998, to either contract with the H-GAC to do a 1996 inventory or to do a 1996 inventory using commission staff. Discussions are still on-going with H-GAC, but regardless of the outcome, a 1996 inventory for commercial aircraft emissions will be submitted as part of the 1996 Periodic Emissions Inventory, which is due to the EPA in mid-July.

EPA commented that the Pulp and Paper MACT rule could no longer provide the 8.26 tons per day previously projected. They stated they will support the inclusion of VOC emission reductions in the SIP, provided that the reductions are included in federally enforceable permits. The EPA requested copies of the permits so that the emission reductions can be reviewed for permanence and enforceability.

The documentation of the federally enforceable VOC emission reductions from the two pulp and paper mills is in Appendix 11c-K. The commission is providing copies of the permits to EPA for review.

EPA commented that as discussed in the September 8, 1997, letter to Chairman McBee, for the emission reductions based on TCMs to be included in the SIP the state should include a detailed description of each TCM project including project description, emission reductions, and schedule for completion. As described in the September 8, 1997, letter, EPA is willing to work with the state to develop a mechanism by which a TCM in the control strategy can be replaced by another TCM without a SIP revision.

H-GAC indicated in their technical comments for this SIP that they will not include TCMs if they are required to provide project specific data. The commission has initiated stakeholder meetings on developing a flexible TCM substitution rule allowing for substitutions without a SIP revision. This mechanism would require the listing of specific projects in the SIP but these could be changed as needed through a public comment process and EPA and commission concurrence. The commission does not intend to list TCMs by categories in this SIP.

EPA commented that emission reductions are double-counted with the creditable emissions reductions to date listed in line 10 of Table 1, page 241.

Commission staff acknowledges the appropriateness of the comment about the double counting of emissions reductions as were seen on line 10 of Table 1, p. 241 of the first version (prior to receipt of comments) of the revised SIP document. Essentially, creditable reductions were taken for the

entire 1990 through 1999 period as opposed to taking credit only for those reductions which occurred from 1990 through 1996. This matter was discussed with EPA Region VI staff prior to the receipt of comments and the correction has been made in Table 1.

EPA commented that the mobile non-road value for NO_x emissions is shown to be 197.68 tons per day for the 1990 ROP inventory. EPA had previously approved a value of 236.92 tons per day based on the 1990 emissions inventory submittal approved on November 8, 1994. EPA requested documentation supporting this reduction in NO_x emissions.

EPA staff has pointed out an area of documentation that was not included in the previous 15% SIP submittals because the commission's strategy or focus was on VOCs as opposed to NO_x. Now that the strategy has broadened to include NO_x as well as VOC, documentation should be provided, in the same manner as the category-by-category changes to the 1990 inventory were shown in the 15% SIP. Commission staff will provide this documentation to EPA Region VI staff at the earliest convenience. Two prior discussions with EPA staff, while underlining the requirement for the documentation of the changes, have not included mention of a specific deadline. Commission staff will correct this after-the-fact deficiency in documentation at the earliest opportunity.

EPA commented that no documentation is provided to explain how the 74.8 tons per day reduction was calculated for pre-1990 mobile source control measures. EPA also requested additional documentation of how the on-road NO_x numbers in the ROP SIP were calculated.

The commission has included documentation, MOBILE5a input files, and a spreadsheet in a new appendix, Appendix 11c-L. Due to a slight change in methodology to be consistent with the previous adjusted base year inventory, the pre-1990 FMVCP and fleet turnover correction was modified by about two tons.

EPA requested MOBILE model input and output files.

In response, the 1999 on-road mobile source inventory documentation compiled by the H-GAC is being provided in Appendix 11c-L.

EPA requested additional documentation on how the 1999 emissions inventory projections were developed for NO_x.

Documentation of the 1999 emission projections for NO_x is as follows: mobile sources in Appendix 11c-L; area and non-road mobile sources were provided to EPA Region VI via electronic QuattroPro spreadsheet file in mid-March; and point source in Appendix 11c-J.

EPA commented that while they believed that the concept of adjusting the point source emissions inventory might have been correct, they did not believe that the calculations were performed in the most appropriate way. They provided information on how they believed the calculations should have been performed.

The commission reviewed the comments provided from EPA, concurred with their suggestion, and modified its calculations. These modified calculations are documented in Appendix 11c-J.

EPA commented that the state should provide information on the distribution of Standard Industrial Classification (SIC) codes for the facilities that responded to the survey.

This data can be found in Appendix 11c-J.

An individual commented that in the final SIP, the commission should explain the true nature of grandfathered facilities. This individual believes that permitting "grandfathered facilities" is not the appropriate or most efficient way to achieve the emission reductions that will be required for the SIP.

Regarding the first point, the commission agrees with the commenter, and has included a section explaining the program more fully. Regarding the second point, the commission has not designed the grandfathered program to achieve emission reductions for the SIP--the Clean Air Responsibility Enterprise Program is a separate program that is being developed as a result of legislative mandate. However, where appropriate, the commission will take credit for any emission reductions that result from this program that are real, quantifiable, and enforceable, just like any other program.

EPA commented that the state needs to provide further documentation of how the NO_x RACT emission reductions were calculated. They commented that the reductions should be documented by source category, providing estimates of rule effectiveness, rule penetration, and control efficiency. EPA also commented that for the documentation of the 9% SIP, the emission projections need to be made to 1999, instead of the projections to 2007 as provided in the attainment demonstration control strategy of the table on page H-5 of Appendix 9c-H.

The commission has included additional documentation of the projected Chapter 117 NO_x RACT reductions in new Appendix 11c-K, "Additional Documentation of Point Source NO_x and VOC Reductions." In contrast to Table 9c-H-5, which represents 1993 UAM input emissions grown to 2007, the projections for the 9% SIP are based on the 1990 emission inventory, adjusted for growth to 1999.

EPA commented that the SIP should state explicitly the on-road mobile source emissions budget for both NO_x and VOC for 1999 as required by the transportation conformity rules.

The budget numbers for VOC and NO_x will be supplied as part of the adopted SIP package, and will be transmitted under separate cover to EPA, TTI, and the H-GAC Metropolitan Planning Organization (MPO).

EPA commented that the state has identified its plans to submit the SIP by December 15, 2000. They believe that the state needs to substitute "commits" for "plans" to be consistent with the EPA policy.

The commission will make the recommended change.

EPA commented that the state needs to include a commitment and schedule to implement the control programs and regulations in a timely manner to meet ROP and achieve attainment.

The proposed SIP contained such a schedule. It will also appear in the final version.

EPA expressed concern that this SIP is not fully approvable in its current form because it lacks an identified control strategy that demonstrates attainment of the standard. They believe that the state should commit to submitting a specific control strategy demonstrating attainment of the standard, and that with such a commitment, a conditional approval may be possible. The EPA suggested that the state commit to providing the list of control measures and supporting modeling by February 28, 1999, as described on page 239.

The commission has started working with the area to select strategies for rule development. The commission will work with EPA staff throughout the control strategy selection and development process to make sure that they are apprised of decisions.

Alcoa commented that the expansion of nonattainment area controls to sources outside the nonattainment area is not mandated by the FCAA or any other federal law and as such, it is subject to the requirements of Senate Bill (SB) 633.

The commission will evaluate the necessity of conducting a cost/benefit review such as that required by SB 633. However, this SIP revision does not contain any adopted rules. Therefore, even if this analysis is ultimately required, it would not be performed until specific rules are proposed to accomplish the target level of reductions.

DuPont commented that the commission should incorporate the concept of "control costs equity" into its consideration of controls in perimeter counties. This concept weights the cost-effectiveness of various controls by their ability to reduce ozone within the HGA area. Less effective controls

(potentially those further distant or downwind from the area) would therefore have a higher control cost, and that control cost would factor into a judgement about whether to implement it in the area.

The commission is not selecting control strategies with this SIP, and therefore will not apply this concept to the current list of potential control measures included in this revision. However, the commission will work with the commenter and other stakeholders to develop these types of analyses over the next two years to aid in control strategy selection.

Exxon supported a regional approach to air quality that incorporates sound science into the selection of control strategies

The commission agrees, and will work with the commenter and other stakeholders to ensure that these concepts are used in the strategy selection process.

Exxon commented that since control measures will impact all emission sources, public participation and stakeholder endorsement of a regional plan will be critical to its acceptance and ultimate success. Exxon encouraged the commission to facilitate the public-private dialogue needed to facilitate a successful outcome to the regional approach.

The commission agrees that public understanding and support for the plan will be crucial to its success. The commission will work with all interested stakeholders over the next two and one-half years to ensure that there has been public input into the decision-making process.

Exxon recommended that the following elements be incorporated into the commission's analysis of NO_x control options to help assure that final selection of control measures are cost-effective and provide real ozone reduction benefit:

- Control options should be assessed for the technical feasibility of achieving the targeted emissions reductions
- Control options should be assessed for investment cost-effectiveness in terms of annualized cost per unit of NO_x reduction (e.g. $/ton NO_x reduction)
- Control options should be modeled for ozone exposure reduction benefit-cost in terms of reduction in ozone exposure per annualized cost (e.g., ppb-km2-hour/$)

While the commission acknowledges that there are a variety of methods to assess cost-effectiveness, it has not yet determined which methods to use as part of the control strategy selection process. The commission will work with the commenter and other stakeholders to develop appropriate control strategy selection criteria.

Exxon recommended that the commission strongly consider the regional or national approaches to cleaner burning fuels being discussed by API with EPA.

The commission announced its new clean air plan back in January. One component of the new strategy is cleaner burning gasoline. The commission held a stakeholder meeting on April 13, 1998. Through such meetings with stakeholders the commission expects to arrive at a fuel that is both very clean and economically feasible and practicable to implement.

Exxon encouraged the commission to obtain and take credit for VOC and NO_x reductions through rulemaking under 30 TAC Chapters 115 and 117, and not under 30 TAC Chapter 116.

Under legislative mandate, the commission is engaged in an effort to bring previously unpermitted (sometimes called grandfathered) sources into the state permitting program on a voluntary basis. This effort is expected to result in emission reductions across the state. When appropriate, those reductions will be quantified for the HGA SIP in a later SIP submittal. The commission will work with the regulated community to integrate the implementation of this program with future VOC and NO_x rules, and to avoid double counting of emission reductions.

Exxon expressed support for the regulatory innovation and flexibility built into existing Chapter 117, and encouraged the agency to establish a regulatory structure within the SIP that stimulates innovation and provides flexibility for cost-effective emissions reductions.

The agency is committed to adding more flexibility to the regulatory structure, so that affected sources have a full range of options in achieving compliance in a cost-effective manner.

HL&P commented that the list of potential control strategies in the SIP is point source dominated. They believe that there are insufficient area and mobile source controls proposed to achieve the required reductions indicated by the modeling as necessary for attainment, and they requested that the commission quantify additional mobile and area source control measures.

The commission believes that the NO_x emissions inventory for the HGA area is point source dominated. Point sources alone make up more than half of the total emissions inventory.

Additionally, many on-road and non-road mobile source control strategies will require substantial public support if their implementation is to be successful. In the proposal phase of this SIP, the commission gave local citizens and elected officials an opportunity to suggest control measures that would most directly affect them. The commission received suggestions from many segments of the population, and those suggestions have been included in the local options section of the final version of the SIP.

HL&P commented that with the stringent NO_x emission limits that would be required under the ozone control strategy, very few sources would be able to create surplus reductions, i.e., reductions beyond those specified by rule, for use in trading. HL&P stated that this would have a negative impact on market-based trading, and would increase overall compliance costs.

The existing NO_x RACT rules in Chapter 117 allow several flexible options besides compliance with individual unit emission limitations: system-wide emissions averaging for electric utility sources; plant-wide emissions averaging and source cap for industrial combustion sources; and trading (all sources). These options, taken with a possible emissions budget ("cap and allocation") market-based system, offer a wide range of alternatives to achieve compliance in a cost-effective manner. The success of any market-based trading system is based on the inherent economic incentive within the system to reduce pollution at the lowest possible cost, thus allowing the marketplace to determine the overall cost of compliance. It is important to note that reduction of ozone precursors, and eventual attainment of the ozone standard, is the ultimate driver of the regulatory system. Market-based systems have been designed and implemented to meet this goal, but cannot be considered to be goals in themselves which are independent of air quality goals.

The Center for Energy and Economic Development (CEED) expressed concern that this SIP proposal may place unnecessary burdens on industries located outside of the nonattainment area.

The commission believes that ozone in the eastern half of the state is a regional problem. Therefore, the commission has designed a regional strategy to assist not just the HGA area, but also other areas in the state that violate the 1-hour and 8-hour standards. The commission believes that in some cases, controls on point, area, and mobile sources may be needed to improve air quality across the region. The commission will work with affected stakeholders to ensure that these controls do not place an unnecessary burden on industry.

EPA's IIG states that VOC emissions can have impacts up to 100 km away from an urban area. The guidance further states that NO_x emissions can have impacts up to 200 km from their original site. In addition, EPA's new 8-hour ozone standard will challenge several of Texas' near nonattainment areas. Reductions made in outlying areas will help to reduce background levels of ozone and help the near nonattainment areas maintain their compliance with the ozone standard.

CEED recommended that the commission form an advisory panel of interested and knowledgeable parties that could assist in defining the issues and developing options for the regional strategy.

The commission will consider forming such a panel. In the mean time, the commission has been working with affected stakeholders to discuss the implementation strategy for a cleaner-burning fuel and Stage I vapor recovery at gasoline stations in the eastern half of the state.

An individual commented that regional solutions are needed but suggested that by regional, we need to think statewide and beyond.

The commission agrees that a regional approach is needed, and will continue to perform the analyses that are necessary to help design the appropriate control strategy.

Harris County Judge Robert Eckels commented that the air quality issues in the HGA area are of a regional nature and will need a regional solution. He stated that Harris County, the City of Houston, the Mayor's office, the other regional elected officials, county judges, the mayors, and H-GAC members will have an air quality summit to begin a regional clean air initiative sometime in May or June of this year.

The commission agrees with the commenter and looks forward to working with the commenter and other stakeholders to develop regional solutions and to participating in this and other forums.

Harris County Judge Robert Eckels commented that Harris County is looking at providing tax abatements to tie economic development issues with industries that are both ensuring new jobs and the tax base for the community and are also meeting air quality standards. Judge Eckels commented that they are looking to go beyond EPA's and the commission's requirements with this initiative.

The commission believes that cost effective approaches will be a key to continued improvement in air quality in the HGA area, and welcomes Judge Eckels' initiative.

Harris County Judge Robert Eckels supported further investigation of the following programs as potential local options:

- region-wide emission testing
- expanded use of reformulated gasoline
- early availability of national low emitting vehicles
- more efficient regional transportation systems including mass transit options
- smart transportation systems such as TranStar

The commission will include these suggestions in the list of local options and will consider them during the control strategy selection and development process.

Harris County Judge Robert Eckels commented that the area should look at the priorities as they have been stated by the H-GAC BOD, and GHP to ensure that the controls that we implement are user-friendly, cost-effective, and health-conscious.

The commission has incorporated the H-GAC BOD priorities into the SIP Local Options Section, and will be using them during the control strategy selection and development process.

One individual commented on the harmful effects of methyl tertiary butyl ether (MTBE) in the formulation of reformulated gasoline. The commenter also stated that if you took MTBE out of the gasoline, fuel efficiency would go up and it would have no other effect.

MTBE is a chemical compound used in the formulation of reformulated gasoline. It has been in gasoline in the United States since the 1970s, principally as an octane booster. Because of its oxygen-containing properties, MTBE is added to gasoline to promote more complete combustion. RFG is required by the FCAA Amendments of 1990 for the worst nine nonattainment areas in the U.S., which includes the HGA area. RFG is mandated to contain a minimum of 2.0% oxygen by weight, typically achieved by the addition of 11% MTBE or 5% ethanol by volume. RFG containing oxygenate at this level reduces the amount of VOCs and toxic air pollutants by the displacement of more harmful compounds such as benzene, found in conventional gasoline.

Regarding exposure of the general public to MTBE, limited epidemiological studies and controlled exposure studies conducted to date do not support the contention that MTBE as used in oxygenated fuels is causing significant increases in acute human health symptoms or illness. EPA estimates that the upper-bound cancer unit risks for MTBE are substantially less than for benzene, a minor constituent of gasoline classified as a known carcinogen; and more than 100 times less than for 1,3-butadiene, a carcinogenic emission product of incomplete fuel combustion. However, the agency will continue to monitor the ongoing and additional studies conducted by EPA and other agencies, to ensure that the public is not being endangered by MTBE.

There is a disadvantage to the use of RFG. Oxygenates, such as MTBE, generally have a lower volumetric energy content than gasoline. Thus oxygenates reduce the energy content of the RFG. This reduction in the gasolines energy content results in a 1-3% reduction in a vehicle's fuel economy. This reduction is considered small compared to the emissions benefit received from the use of oxygenated fuel.

Alcoa, EHCMA, Exxon, DuPont, HL&P and TCC expressed concern that the commission has overestimated the potential NO_x emission reductions achievable through retrofit technology for existing combustion point sources.

The estimates of technically feasible reductions represent only a limited, high level analysis of the point source inventory. The time constraint requiring completion of this SIP revision by April, 1998 prevents the staff from developing a more in-depth analysis of technical feasibility at this time. The estimate presented did not consider economic factors, which must be considered as a rule is being developed to establish what is practicable. The line of reasoning in estimating that a 90% reduction is technically feasible started with the knowledge that there are only a handful of sources in the HGA area which are already controlled 90% or more with selective catalytic reduction (SCR). The technology is probably capable of removing more than 90% of the NO_x from the most technically difficult to control source. The exhaust could be ducted away to controls built on top of an existing unit, interfering contaminants could be scrubbed, the stream reheated, and SCR could be applied. However, the cost would likely be extremely high. At the maximum technically feasible level of reductions, there will be many low capacity factor and technically difficult-to-control sources which will not be controllable within cost ranges previously considered typical. Rule development will need to include economic and environmental factors and provide answers to such questions as how much of the total point source emissions are controllable at a specified cost.

Exxon commented that the commission should assess the technical and economic feasibility of broadly mandating SCR technology. GHASP commented that SCR is an affordable and technologically feasible control technology and that there is no reason not to implement it on a massive scale in the Houston

area. GHASP also commented that other technologies are available or being developed, and provided articles which reference such technologies.

The rules will mandate emission limitations or reduction targets, not control technology, such as SCR. The experience from areas which have set very low NO_x emission limits suggests that a variety of control technologies will be used and that new ones will continue to be developed. For example, there are low-NO_x burners operating today on natural gas-fired boilers with emissions of 9 ppm NO_x (at 3% O_2; is 0.01 pound NO_x per million Btu). This emission level represents more than a 90% emission reduction and illustrates that there are controls currently available other than SCR, capable of the deep NO_x reductions that are necessary to attain the ozone standard in Houston. The market has a history of responding with innovative solutions to firmly established government standards which have focused, but reasonable implementation schedules. One such solution may be the catalytic combustor for gas turbines, with the promise of emissions of 3 ppm NO_x (at 15% O_2; is also 0.01 pound NO_x per million Btu). This type of combustor, which doesn't require the ammonia injection of SCR and is more akin to a pollution prevention device, is in the research and development phase, and appears to have strong commercial potential.

Exxon advocated that decisions on the technical and economic feasibility of low-NO_x burner and SCR retrofits be made on a unit-by-unit basis.

A goal of the commission is to develop more simple rules, which give maximum flexibility on how to achieve an environmental goal. Rules which combine emission reduction targets with flexibility have proven to be much more cost-effective than equipment standards or inflexible reduction requirements. The commission's rules for existing point source NO_x reduction, Chapter 117,

follows this commission principle of regulatory reform. The emission specifications, or goals, can be met through unit-by-unit compliance, plant-wide averaging, source caps, or emission trading. When the commission establishes reduction targets and flexible compliance options in this manner, the unit-by-unit control technology decisions may be more effectively and efficiently left to the source owners.

The commission understands that Exxon does not mean to suggest the use of a case-by-case permitting approach to resolve the economic and technical issues which must be addressed for every unit. Such an approach would involve thousands of negotiated agreements between commission and industry staff, and would be unlikely to match the process described above in equitability, economic efficiency, timeliness, and effectiveness in achieving the targets.

Nonetheless, the commission still faces the challenge of establishing the overall reduction targets. Setting the emission targets will involve consideration of their effectiveness in achieving the ozone attainment goal, the technical and economic feasibility of their implementation, and the equitability of their distribution among sources. Technical and economic feasibility factors will need to be considered in depth for classes of units, and perhaps, industry types. Equitability requires efforts to apply the reduction requirements broadly to sources not currently subject to emission limits in Chapter 117, and to give the proper consideration to source reductions that have already been made.

Exxon suggested the commission examine the potential adverse environmental consequences of inadvertent ammonia emissions resulting from the application of SCR.

The commission agrees that it is appropriate to examine the potential environmental, as well as the technical and economic consequences of the NO_x control strategy. Exxon referred to the potential for inadvertent ammonia emissions to form PM which may contribute to regional haze. The staff notes that NO_x also contributes to regional haze, through nitrates, which coalesce to form aerosol PM. Since an SCR system may be designed to remove several hundred NO_x molecules for every molecule of ammonia which is emitted, widespread application of SCR would logically have a very positive impact on regional visibility as well as ozone.

Ammonia slip is a controllable design parameter. Since these emissions are undesirable from an economic and environmental standpoint, there is incentive to minimize them. Improvements in the technology have occurred in the last decade, and emissions below 1 ppm are typical.

HL&P expressed concern that 80% reduction from coal-fired utility boilers which are already controlled in the range of 0.4 pound NO_x per million Btu, characteristic of the HL&P coal-fired units, may be infeasible because of excessive ammonia slip.

Since Table 9c-H-5 was prepared, information has come to the staff's attention that an 80-85% reduction from coal-fired utility boilers already controlled in the range of 0.4 pound NO_x per million Btu is a practical level of reduction and that there is no reason to expect special concerns about ammonia slip at these levels. At a 95% NO_x removal level, ammonia slip probably would raise the concerns that HL&P alludes to. Utility coal-fired boiler retrofits with SCR are large engineering projects and a relatively recent phenomenon (most within the last 10 years). This has led to a great deal of recent information available in the technical literature. The establishment

of regulatory limits will necessitate further scrutiny of the available information to establish emission standards which are achievable, effective, and environmentally sound.

GHASP expressed concern that the commission failed to consider reductions of offshore drilling platform emissions of NO_x and VOC. They said that if there is to be a regional strategy to reduce emissions, these platforms must have their emissions reduced since they are in the prevailing wind direction that blows toward HGA.

GHASP referred to the discussion on page 132, which describes a portion of the development of the base future year (2007) emissions for point sources. This base is the starting point from which reduction scenarios are later analyzed to determine what it will take to attain the standard. The base future year inventory includes growth to 2007 and reductions from adopted rules which did not affect the 1993 COAST base inventory, but do reduce year 2007 emissions. This is a starting case inventory because it reflects the expected emissions in the attainment year, before new reduction strategies are considered. Offshore stationary sources which are within the counties' 9 nautical mile offshore boundary are subject to the commission's stationary source rules, including emission control and inventory reporting requirements, and were treated the same as the other sources within the nonattainment counties, as described starting on page 127. There are no new rules for offshore sources in waters outside this boundary, so it was proper not to reduce the emissions for the base future year inventory for these sources.

Reductions from offshore platforms in the Gulf of Mexico outside the county boundaries are addressed, jurisdictionally, at the federal level. The FCAA, §328(b), directs the Secretary of the Interior to conduct a study to examine the air quality impacts of emissions from Outer

Continental Shelf activities in the western Gulf of Mexico on areas that fail to meet the ozone NAAQS. The law requires the Secretary of the Interior, in consultation with the EPA Administrator, to determine, based on the study, if additional actions are required. The study concluded that reductions from these sources would not benefit the ozone nonattainment areas along the Gulf Coast, but it may not have fully considered the "stiffness" of the model, where there is no appreciable ozone reduction response until deep reductions have been made. The commission will continue to investigate the effectiveness of reductions from these sources.

Temple-Inland commented that they could not imagine the commission being able to extract NO_x reductions from the pulp and paper industry beyond what is expected through the federal initiatives: the Pulp and Paper MACT "Cluster", the Wood Products MACT and New Source Performance Standards, Industrial Combustion Coordinated Rulemaking, regional haze, ozone and $PM_{2.5}$ implementation.

This ozone SIP revision contains only a high-level estimate of potential NO_x reductions. The commission appreciates the opportunity in the 9% ROP portion of this SIP to rely on the VOC reductions made by the paper industry in the HGA area since 1990. Since this entire SIP revision is an ozone implementation action, it is included in the federal initiatives that Temple-Inland cites, rather than going beyond them. The state is responsible for developing the NO_x reduction targets necessary to attain the ozone standard. The commission agrees with Temple-Inland, from the standpoint that establishing specific NO_x reductions rules will require an analysis of NO_x reductions that have already been made, or are specified in adopted federal rules which require compliance by 2007.

GHASP commented that the modeling did not incorporate emissions reductions due to either I/M or RFG, and recommends disapproval of the SIP based on this omission.

Complete information on RFG and I/M was not available at the time the 2007 emissions inventory was developed; thus, considering timing constraints on the modeling, it was necessary to build the 2007 inventory assuming only existing mobile source regulations.

The modeling conducted for the SIP was used to determine directional guidance (i.e. VOC vs. NO_x controls) and to establish the levels of control required to reach attainment, not to evaluate specific control strategies. The modeling conducted was sufficient for the purposes of the SIP. When modeling is conducted for purposes of evaluating specific controls, then both I/M and RFG will be explicitly accounted for. Note that the modeling did indirectly account for the reductions due to I/M and RFG through application of across-the-board VOC reductions, although it is true that the modeled reductions are not as precisely targeted as direct modeling of the specific controls.

GHASP commented that a negative growth factor should be used for biogenic emissions, since trees are being cut down faster than they are being planted.

The commission invites GHASP to share specific information on the rates of tree planting and cutting, so that the commission can use this data to improve the emissions inventory. The commission agrees that biogenic emissions may change over time, and will consider using scientifically valid methods to forecast changes in biogenic emissions over time in its future modeling efforts.

GHASP asked why reductions to non-point source NO_x emissions were shown by the modeling to be more effective in reducing ozone levels than reductions to point source emissions of NO_x.

Because the 1-hour ozone standard is defined in terms of the peak ozone concentration, the modeling results in the SIP are generally reported in terms of the peak predicted 1-hour ozone concentration within the nonattainment area. The modeling indicates that this peak responds more to non-point source reductions than to point source reductions. The modeling did not address which sources of NO_x were more responsible for causing elevated ozone over wide areas.

GHASP commented that a "reasonably good chance" to attain the standard is not sufficient, and that the reductions assumed in Table 27 are not sufficient to meet attainment.

The commission believes that reductions capable of producing a "reasonably good chance" for attainment, while providing the air quality benefits shown in Table 27, are worthwhile and should be pursued. However, the commission agrees with the commenter that reductions sufficient to attain the standard are necessary, and plans to use refined modeling to more precisely define specific reductions designed to attain the standard.

GHASP commented that it disagrees that the modeling submitted in the SIP proposal shows attainment, citing concerns about the lack of specific controls, the timing of controls, use of "only one modeling run", uncertainty of emissions inventories, and the claim that "the relative effectiveness of VOC vs. NO_x reductions in the HGA nonattainment area was not specifically evaluated". GHASP also noted that controls implemented in 2003 will "give us no leeway to add more controls if we are still out of attainment in 2005 or 2007."

The modeling submitted with the SIP proposal does not purport to constitute a complete attainment demonstration, but rather demonstrates emission levels which could bring the area into attainment by 2007. The modeling performed can be thought of as establishing a nonattainment area-wide emissions cap, under which the area would be expected to reach attainment, and as such gives the commission an emissions target to aim for in 2007.

The commenter is mistaken in indicating that only "one model run" was used in the SIP. It is likely that the commenter was objecting to the use of a single modeling episode, which has been discussed elsewhere in the analysis of testimony.

The commission believes the commenter has taken the phrase "the relative effectiveness of VOC vs. NO_x reductions in the HGA nonattainment area was not specifically evaluated" out of its original context. Much of the SIP proposal discusses the evaluation of VOC vs. NO_x controls. The statement quoted by the commenter relates to a very small subset of the modeling, performed assuming the OTAG 5c reduction strategy outside the HGA 8-county nonattainment area.

Because there does exist a significant degree of uncertainty in the emissions inventory, the alternative inventories were developed to help bound the uncertainty.

Finally, the commission plans to periodically assess the air quality in the HGA nonattainment area, both through ambient monitoring and with modeling. Reductions implemented in 2003 will have been evaluated prior to implementation, and will be monitored for effectiveness through continued air quality analysis. The commission believes that this approach will bring the area into attainment of the 1-hour ozone standard by 2007.

GHASP commented that, "on page 195, a further concern is that the demonstration that this plan will meet the attainment date is predicated on NO_x monitoring that is not available or the validity of which is suspect below a certain concentration level in the air."

The commission believes the commenter may be confused regarding the linkage of the air quality trends analyses and the uncertainty attached to NO_x monitoring conducted at low concentrations. The concern over the accuracy for historic measurements of NO_x levels, noted on page 195 of the proposal, was for cases when the NO_x concentrations were less than 10 parts per billion (ppb). This concern relates to uncertainty in the results of ratio analyses or smog production analyses (discussed on page 195) performed with NO_x measurements that are below 10 ppb. The air quality trends analyses, discussed in a subsequent portion of the proposal, were performed with NO_x concentrations that were above 40 ppb, and at such levels, the measurements are considered to be accurate.

GHASP commented on the effectiveness of VOC controls near the source mentioned on page 195. They were concerned about the emissions reduction assumptions mentioned on page 199. They also were concerned about emission reduction rates in the past, the effectiveness of past emissions inventories, and that the VOC/NO_x ratios had to be modified to make the modeling work.

The first comment on the effectiveness of VOC controls relates to the results of the SMOG Production algorithm. This observational technique was based on monitoring data and is presented to show that these results were directionally consistent with those obtained with the more robust UAM modeling. The emissions reductions discussion on page 199 related to analysis of the results for tracking monitored values of ozone precursors. The point made in the SIP was

that if monitored values of NO_x, VOC and ozone have decreased under the present SIP, then more pronounced reductions can be expected when larger emission reductions are implemented as described in this SIP. In the SIP the commission acknowledges the difficulties with comparing the results of past emissions inventories. On the issue of the modification of the VOC/NO_x ratios, the commenter is mistaken. None of the emissions, nor the VOC/NO_x ratios were modified to obtain better model performance. In fact, model performance degraded when the alternate inventories were modeled.

GHASP commented that "it is assumed that alternative A EI is better" and that under the "best" and "worst" case assumptions there is a large difference in the amounts of required NO_x reductions. GHASP further commented that "if the commission is wrong, it could be wrong by over 100%", and that the analysis is insufficient to demonstrate attainment by 2007. The comment concludes that "You have not made your case."

The commenter is mistaken in the assertion that the commission assumes that alternative A (Alternative I) is better. The commission has used a range of input emissions to determine whether the directional guidance developed with the base inventory is valid under reasonable alternatives, and to establish a range of reductions necessary to reach attainment. At no time has the commission expressed the belief that either alternative inventory is better than the base. Since the commission has simply established a range of reduction targets, without selecting any specific alternative, the last three comments are not applicable.

SC commented that improved emissions inventories and monitoring are needed, and that [ambient] data should be used to pinpoint model deficiencies. SC also commented that, while the primary goal is

achieving the [ozone] standard, results and reduction strategies must be indicative of what needs to be done to reduce ozone, NO_x, and VOCs.

The commission agrees that emissions inventories and monitoring need to be improved, and plans to continue its efforts along these lines. As noted in the SIP proposal, the commission used ambient data in the HGA area to evaluate the emissions inventory and to assess model performance, and used the results of observation-based modeling (using ambient data) to corroborate results of the photochemical modeling. The commission plans to continue the use of these and similar analyses in the future.

The commission is continuing to improve the emissions inventory process through initiatives such as participation in the national Emissions Inventory Improvement Program and by conducting regular seminars with industry. The commission attempts to use the most accurate, timely emissions data possible in its modeling activities.

Data for area, mobile, and biogenic sources are developed by commission staff or under contract, and are based upon EPA-approved methodologies.

Emissions for point sources are submitted by industry, and all effort is taken to ensure the accuracy of the numbers submitted by industry and entered into the commission's PSDB. A letter was sent to each submitting account representative giving a summary of emissions updated into the PSDB for 1996 soliciting input to correct any errors. Commission staff will continue working with industry to correct the reported inventory.

While the commission is sensitive to SC's desire to reduce all forms of air emissions, as the commenter notes, the primary goal of this SIP is achieving the ozone standard. Reductions of emissions not specifically designed to meet the ozone standard must be considered outside the context of this SIP.

EHCMA commented that point source NO_x growth assumed in the modeling is likely overestimated, due to recent point source regulations. EHCMA further recommended that the commission use ambient trends to predict future point source emissions. Amoco notes that the growth used for point sources is inconsistent with offset requirements, and indicates that the commission should clarify/explain how offset requirements impact growth projections. MTC commented that modeling should account for offsets either through modifications to the growth model, or through application of control factors which include offset reductions.

The commission agrees that the methodology used to forecast growth of point source emissions needs to be re-evaluated and, if appropriate, modified. Use of historical emissions inventory data as well as ambient monitoring data will be considered in developing growth factors for future modeling. The commission also plans to investigate ways in which offsets can be accounted for in developing growth and/or control factors for future modeling applications. The discussion of growth projections in the Future Year (2007) EI section of the SIP will be modified to reflect the fact that no correction for offsets was applied.

While ambient monitoring data can be useful in evaluating the reasonableness of predicted emissions trends, they are not sufficient alone to establish growth rates. While monitors show

actual levels of NO_x, they do not indicate the reasons for changes. Furthermore, monitors are located in discrete areas, so they do not reflect the emissions across an entire region.

Amoco encouraged the commission to continue evaluating the impacts of biogenic emissions by further study via new models or inventories. DuPont commented that the biogenic VOC and NO_x emissions used in the modeling are too large. DuPont and the TCC commented that the commission should continue its efforts to validate the biogenic emissions inventory, and further recommended that the commission revise its strategy, should further research determine that significant errors exist in the biogenic emissions inventory.

The commission agrees that the role of biogenics is crucial to accurate modeling, and in fact is planning a study of biomass densities (a key component of all biogenic emissions models) in the HGA and Beaumont-Port Arthur (BPA) areas for the summer of 1998. Updates to the biogenic emissions inventory resulting from the study (or any other activities which provide improvements) will be incorporated into future modeling for the area. Control strategies will be re-evaluated whenever necessary, based on updated modeling results.

H-GAC commented that the commission offers no plausible explanation as to why mobile source models and activity estimates may under-report VOC emissions by a factor of two and over-report NO_x emissions by 25%. Further, H-GAC commented that it is unclear how the MPO is to proceed with conformity analysis and/or ROP SIP support if the mobile source VOC inventory is represented by a possible range.

Several ambient air studies, including that performed by Sonoma Technology, Inc. for the COAST study and referenced in the SIP proposal, have indicated that motor vehicle VOC emissions may be underestimated by the MOBILE model by as much as a factor of three. Other studies have indicated that the uncertainty in on-road mobile source NO_x emissions is 25% or more. Since the alternative inventories were designed to make the modeling inventory VOC/NO_x ratio match more closely with the ambient ratio, the alternative inventories reduced on-road mobile source NO_x by 25%.

The alternative inventories must be regarded as sensitivity analysis inventories only. Therefore, in the future, emissions budgets should be calculated using the base inventory. However, the current SIP does not establish an on-road mobile source emissions budget.

ACCC commented that one conclusion of the modeling is that ozone formed outside the nonattainment area at times influences ozone levels inside the nonattainment area, and that this conclusion is based on "a model run in which ozone levels over a 3-day span are impacted by transport from the southeast boundary of the nonattainment area". The ACCC further commented that "the SIP document does not elaborate on the origin of this cloud of ozone." The ACCC indicated that this modeling was used as part of the technical justification for the State Proposed Regional Strategy.

The basis for concluding that sources outside the nonattainment area have some influence within the nonattainment area is a series of model runs wherein reductions within the 8-county nonattainment area were coupled with broad reductions outside the nonattainment area. The commission did not attempt to assign the culpability for the external contribution to any specific region. While a large area of elevated ozone not attributable to local origin was noted over the

Gulf of Mexico in a sensitivity execution of the model, the influence of this "cloud" on ozone levels within the nonattainment area has not been assessed specifically, nor has the commission performed culpability analysis to determine the origins of the cloud. The only conclusion that can be drawn from the modeling presented in the SIP proposal is that blanket emission reductions outside the 8-county nonattainment area have some benefit for air quality within the region.

MTC, TCC, and DuPont commented that a proprietary model such as UAM-V should not be used for SIP development because it does not allow outside parties to examine certain elements of model function.

The commission agrees. When the modeling work for this SIP was initiated, EPA indicated that the UAM-V would soon become a public domain model. That has not happened. Further modeling work for SIP development will be performed with a public domain model. The commission plans to use Comprehensive Air Model with Extensions to develop the next SIP revision.

MTC commented that the emissions projection model should be evaluated.

The commission agrees. A project to evaluate the emissions projection methods is being developed. Additionally, projects are planned for performance evaluation of the emissions inventories. It is anticipated that these will be an integral part of the emissions evaluation for subsequent SIPs.

Alcoa commented that the COAST emissions inventory was developed for nonattainment areas and did not consider sources outside these areas. Alcoa further commented that as a result, the commission is advocating significant emissions reductions without the benefit of a complete emissions inventory.

While a particularly detailed inventory for the eight HGA and three BPA nonattainment counties was developed as part of COAST, the COAST project also considered sources in attainment counties. In particular, two studies (a biogenic emissions project and a bottom-up area source emissions project) conducted as part of the COAST project collected data for all counties in the COAST modeling domain which extends far beyond the nonattainment counties. The commission also developed attainment county emissions estimates for the remaining inventory categories, using EPA-approved methodologies. Regional modeling (used to establish boundary conditions) used an emissions inventory developed from the OTAG emissions inventory.

Before adopting a regional control strategy, the commission will fully evaluate the benefits of such reductions not only on the HGA area, but also on other nonattainment areas, and areas outside the nonattainment areas. The emissions inventory used in modeling for evaluation of a regional strategy will be of the highest quality possible.

An individual questioned the appropriateness of the photochemical model used by the commission. The commenter was particularly concerned with the treatment of the vertical layering of the atmosphere by the model, and whether the commission had conducted sampling in the vertical layers. The commenter was also concerned with whether data points outside of Harris County had been modeled.

The Urban Airshed Model is the EPA-recommended tool for urban-scale ozone modeling applications. The UAM system is a layered grid model system that accounts for transport and diffusion of pollutants in both the horizontal and vertical. It also simulates chemical reactions leading to ozone production, and is considered the state-of-the-science. As noted in the SIP proposal, the variable grid version (UAM-V) was used because of technical improvements incorporated into the model. It was compared to the original EPA version (UAM-IV) and was deemed to be equivalent or better.

Regarding the comment about the date used, for this modeling, input data from the COAST study was used. The COAST modeling domain extended well outside the Harris County area, from Travis County on the west to western Louisiana on the east. As a part of the COAST study, a monitor was placed on top of a tall building in downtown Houston. The data that was collected there was used during the performance evaluation of the modeling.

An individual commented that there appears to be a discrepancy between two matrices in the SIP proposal which show biogenic emissions. Specifically, the individual commented that "it seems as though the biogenic sources in Beaumont are a whole lot less than they are in Houston. So I don't understand that".

It is unclear as to what portion of the SIP document the individual is referring. It is likely that the two matrices are references to Tables 7 and 9, which list modeled emissions by category for Harris and Jefferson counties, respectively, for each day modeled. In these tables, biogenic VOC emissions for Harris County are seen to be 3-4 times as large as those for Jefferson County. The reasons for the difference are that: 1) Harris County is significantly larger than Jefferson County,

and 2) a large portion of Jefferson County consists of marshland and farmland, which have relatively low biogenic emissions.

GHASP commented that the assumption of no growth in offshore point sources is suspect, and indicates there has been an increase in offshore activity since the early 1990's.

The commission agrees that the growth rates of offshore point sources should be investigated. Since no forecast to 2007 was available at the time of the modeling for the SIP, the commission adopted the assumption made by OTAG, that of no growth in offshore activity through 2007. However, the commission will again consider the growth rates of offshore point sources in future modeling activities.

GHASP expressed concern that the commission should track and verify claims of VOC emission reductions made by two pulp and paper mills.

The commission has verified federally enforceable pulp and paper mill emission reductions of 2.2 tons per day since 1990. The documentation is in Appendix 11c-K. These reductions were made enforceable through New Source Review permits. Copies of the permits are being provided to the EPA, and are available to anyone upon request.

GHASP, GHP, SC, EHCMA, Amoco, TCC, MTC, and an individual commented that only one episode had been used for modeling. Most of these commenters indicated that more episodes need to be used to develop the control strategies.

The commission is in agreement that multiple episodes are desirable, and has in fact conducted modeling with several candidate episodes since 1993. Although the current SIP revision focuses only on the COAST episodes, the following discussion provides a historical perspective on episodes considered for modeling.

The commission has considered seven different episodes covering 31 days for UAM modeling in the HGA area. These are listed below with the results for each for the HGA area:

1. **May 15 - May 19, 1988 (5 days) -used UAM-IV with historical data and obtained marginal performance. This modeling was submitted with the 1994 Progress Toward Attainment SIP.**
2. **July 26 - July 31, 1990 (6 days) - used UAM-IV with historical data and obtained good performance. This modeling was submitted with the 1994 Progress Toward Attainment SIP.**
3. **October 9 - October 13, 1991 (5 days) - used UAM-IV with historical data and obtained unacceptable performance.**
4. **October 23 - October 25, 1992 (3 days) - used UAM-V with historical data and obtained unacceptable performance.**
5. **August 17 - August 20, 1993 (4 days) - used UAM-V with COAST data and obtained unacceptable performance.**
6. **August 31 - September 2, 1993 (3 days) - used UAM-V with COAST data and obtained marginal performance.**

7. **September 8 - September 11, 1993 (4 days) - used UAM-V with COAST data and obtained good performance. This modeling is being submitted with the current attainment demonstration SIP.**

The COAST data set, used to develop the last four episodes listed above, contains three major advantages over the historical data used to develop the first three. First, the COAST emissions data included many major enhancements based on bottom-up estimation procedures. Second, the COAST meteorological data set included many additional surface and upper-air observations. Third, the COAST air quality data set is much more extensive than the routinely-collected data. Because the COAST data set is much more complete and detailed than the historical data used to model the 1988-1991 episodes, the commission's modeling staff believes that modeling for this SIP should be conducted using COAST data. Additionally, EPA Region VI strongly urged the use of UAM-V instead of UAM-IV, because of the improved isoprene chemistry algorithm available with UAM-V version 1.24. Thus, although the 1990 episode exhibited relatively good performance, it was not suitable in its present form for use in this SIP. Had the commission had sufficient resources available, it would have been possible to re-run one or more of the pre-COAST episodes using UAM-V, and to some extent the emissions inventory could have been updated using COAST data. However, it was not possible to update these episodes' meteorological characterizations with COAST data, since the COAST study was not performed until 1993, nor was the additional COAST air quality data available for these episodes (note: some COAST monitoring was begun in late 1992, thus the October 1992 episode is considered a COAST episode even though it occurred prior to the main COAST study).

Of the remaining four episodes, two exhibited unsuitable model performance (August 17-20, 1993 and October 23-25, 1993). The August 17-20, 1993 episode has been examined extensively and it appears that its poor performance may be based on the UAM-V model's inability to correctly characterize the atmospheric chemistry that occurred during this episode. The August 31-September 2, 1993 episode was selected to examine ozone formation in the Beaumont/Port Arthur area and does not have ozone concentrations that are typical of the high ozone days in the HGA area. The only suitable choice for the SIP, therefore, is the September 8-11, 1993 episode.

If resources allow, modeling for control strategy development and for the upcoming 8-hour ozone SIP will be based on additional episodes.

GHASP, EHCMA, MTC, and an individual commented on the need for the commission to enhance the models and/or model inputs to have more confidence that selected control measures will be effective and necessary.

The commission believes that, even though the state-of-the-science models, procedures, and inputs have been used, enhancements should continue. The commission has an ongoing program to investigate the chemistry utilized in the model and to upgrade the emissions inventories. The commission plans to incorporate these modifications into the modeling used to develop the specific control strategies for the followup HGA SIP and the 8-hour ozone SIP for the area. Additional verbiage on enhancement of models, modeling procedures, and model inputs will be added to the SIP document in the conclusions to the *Base Case Modeling and Performance Evaluation* section, and in the conclusions to the *Reasonable Achievable Target Modeling* section.

H-GAC staff commented that they believe that the indicated VMT level in Appendix 9c-D, Table D-10 is in error.

The emissions estimates used in the 2007 modeling analysis were completed in 1995 and did not have the benefit of the most current projections. However, the large discrepancy between the H-GAC estimates and the modeling inventory prepared by TTI prompted commission staff to re-examine the model input. While at this writing the investigation is not yet completed, commission staff believes that the discrepancy noted by H-GAC is at least partly due to an error in the input data. Staff of both TTI and the commission are currently attempting to diagnose and correct the problem. The apparent error only affected the 2007 projected emissions inventory, not the base case inventory.

Compared with the most recent projection of 2007 VMT given in H-GAC's comment (136 million miles/day), the modeling inventory overstates the 2007 VMT by approximately 38%, indicating an over-estimation of 2007 on-road mobile source emissions. The actual amount of over-estimation of VOC and NO_x emissions cannot be determined without rebuilding the inventory, since average vehicle speeds are affected by VMT, leading to a non-linear relationship between VMT and emissions. However, the magnitude of the over-estimation of VMT suggests a significant over-estimate in emissions of both NO_x and VOC.

Some of the effects of these potential overstatements of 2007 emissions on the modeling conclusions are summarized below:

1. The target emission levels of VOC and NO_x presented in the Attainment Demonstration Target Calculation section of the SIP proposal may be affected somewhat, since the relative contributions of each of the inventory sectors will change, although the commission expects this to result in only a relatively small change in the target level for NO_x.

2. Overall, because the 2007 inventory may be smaller than previously thought, the required reductions to meet the attainment targets will be consequently reduced.

3. Because the local emission base may be lowered, regional reductions may be relatively more effective in controlling ozone in the nonattainment area than would have been expected using the previous emissions inventory (further analysis will be required to quantify the effect).

Overall, however, the modeling results are not expected to change substantially, since on-road mobile sources in the 2007 inventory as modeled accounted for only about 25% of anthropogenic VOC emissions (and a much smaller fraction of total VOC emissions) in the nonattainment area, while on-road mobile sources contributed about 31% of anthropogenic NO_x. As an example, were both on-road NO_x and VOC to decrease by 50%, the total 2007 anthropogenic VOC inventory would decrease by 12.5%, and the total 2007 anthropogenic NO_x inventory would decrease by 15.5%. Thus the commission believes the conclusions of the SIP remain valid.

Before conducting modeling to evaluate specific controls, the commission will correct any identified errors in the inventory. Additional quality assurance/quality control procedures will be implemented to help identify errors in the model input prior to control strategy modeling.

GHASP commented that the control strategy effectiveness must be assessed, not just by what is possible, but by what past implementation of rules has shown is realistic. They said that rule effectiveness estimates made in the past for VOC reduction rules in Chapter 115 have been too optimistic. They recommended the commission use less optimistic estimates of rule effectiveness, and that the resulting loss of projected emission reductions be made up for with more control requirements.

The commission agrees with GHASP that control strategies must consider what it is achieved in practice, not just what the SIP shows on paper. This comment mirrors the National Academy of Sciences' 1990 report on ozone, which found that the SIP process is "fundamentally sound but is seriously flawed in practice because of the lack of adequate verification programs." They recommended that reliable methods for monitoring progress in reducing emissions of VOCs and NO_x be established to verify directly regulatory compliance and the effectiveness associated with mandated emission controls. The commission does not believe, however, that making arbitrary estimates of control strategy effectiveness, which require assumptions about the number of source owner/operators who overlook the rule, or the amount of time that emission controls are not working properly, is the appropriate method of addressing the issue.

The issue is being addressed through new programs and regulations. The 1990 FCAA addresses these concerns with requirements for enhanced monitoring in Titles I, V, and VII, periodic monitoring in Title VII, and compliance certification in Title V. The Title V operating permit is

intended to improve the effectiveness of the rules by laying out in a single document all the applicable requirements for each major source, including existing and any new monitoring requirements. In the past, government inspectors primarily performed the role of assessing compliance status. Title V also requires the source owner or operator to affirm the source's compliance status.

The new monitoring programs are extensive, and require implementation over time. The emission benefits from the programs, such as EPA's compliance assurance monitoring rules (40 CFR Part 64) and periodic monitoring guidance, will accrue well before the 2007 attainment date for HGA. These programs cover many, but not all of the regulated source categories. The improved monitoring, in conjunction with effectiveness studies, as needed, will enable the commission to better quantify the effectiveness of the rules.

Furthermore, the shift to a NO_x control strategy will enable better verification of the control strategy effectiveness. While much of the VOC point source emissions escape through innumerous millions of pipe connectors, hatches, tank seals, valves, etc., virtually all the point source NO_x is emitted through about 3000 discrete vents or stacks. The fewer number of sources makes direct determination of compliance largely technically and economically feasible. Direct determination of emission compliance is currently required for approximately the largest 300 stacks, comprising the majority of the point source NO_x emissions. The largest emission category, utility boilers, had continuous emission monitoring systems (CEMS) installed in 1995 under the EPA acid rain rules (40 CFR Part 75). Within the two next largest categories, gas turbines and boilers, the larger units must install CEMS (or predictive emission monitoring systems - PEMS) by the end of 1999 under the commission's Chapter 117 rules. Further work will be required to ensure that

enhanced monitoring is applied to the remaining NO_x point sources. Since the remaining categories without CEMS or PEMS include small sources, effective, but less costly compliance verification methods will need to be established.

MTC recommended that the commission provide the committee with more opportunity for timely technical input at various stages of the contracting process. The committee refers to a June 1997 white paper it submitted to the commission. In the white paper, the committee suggests that it (committee) "could be used in a technical advisor role when discussing differing bids for contracts dealing with the SIP modeling process. The commission could better utilize the expertise of the technical committee members by increasing their involvement in review of contractor work efforts."

Legal counsel has advised the commission that the Texas General Services Administration has delegated contracting authority to the commission under the state purchasing act. Under that act it is clear that the agency itself (not external committees or advisory groups) should exercise decision authority over bid evaluation and selection of contractors. The commission will obtain additional legal guidance on what level of committee participation is appropriate for the review of contractor work efforts subsequent to contract award.

MTC and HL&P commented on the large day-to-day variations of projected 2007 point and area source emissions in Tables D-11 and D-12 of Appendix 9c-D.

Both the UAM emission input files and the UAM runs are correct, but there was an error in compiling these tables. There are separate data files for each episode day, each emission class,

each geographical area, and each data source, resulting in a total of 270 files that were compiled to form these tables.

In Table D-11, point and area source NO_x emissions from offshore (Gulf of Mexico) oil and gas production platforms for September 7, 1993 - September 11, 1993 were incorrectly included in September 6, 1993. Likewise, in Table D-12, point and area source VOC emissions from offshore (Gulf of Mexico) oil and gas production platforms for September 7, 1993 - September 11, 1993 were incorrectly included in September 6, 1993.

The unusually large VOC emissions, shown in Table D-12 for 2007 area sources on September 11, 1993, are correct and attributed to weekend activities, including boating and lawn mowing.

Tables D-11 and D-12 in Appendix 9c-D will be corrected.